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Entorrhiza calospora sp. nov., and Some Other Parasitic Fungi in *Limeum* Roots.

By

P. H. B. Talbot.

Summary.

A fungus, described here as *Entorrhiza calospora* sp. nov.* and assumed to belong to the Tilletiaceae in the absence of proof by germination of the chlamydospores, is associated with large galls on the roots of *Limeum glomeratum*, *L. viscosum* and *Trianthema pentandra* in the Transvaal and on *L. viscosum* from Ficksburg, O.F.S. The galls range in diameter from less than 1 mm. to 3·5 cm. They are composed of parenchymatous cells in which the fine mycelium, often coiled, bears globose, strongly verrucose, binucleate chlamydospores 17·4–22 μ in diameter, produced singly but forming groups of up to twenty per host cell. The dry chlamydospores are lemon yellow to golden in a mass. A dusty sorus of chlamydospores is not formed; instead the spores are liberated by the gradual disintegration of the galls when the host dies in autumn. Germination of the spores and re-infection of the hosts were not observed. The parasite does not appear to harm the plant as a whole, since its aerial parts show no signs of disease nor of stimulation. *Olpidium brassicae* (Woronin) Dangeard, *Ligniera junci* (Schwartz) Maire & Tison, and an unidentified Phycomycete, were also found in the roots of a single plant of *Limeum viscosum* which bore *Entorrhiza* galls.

Occurrence of *Entorrhiza calospora*.

In 1943, Mr. J. J. O. Pazzi collected some specimens of *Limeum glomeratum* at Brummeria, near Pretoria, and brought them to the Division of Botany and Plant Pathology. On their finer roots were many large galls whose cells contained abundant warted resting-spores which were thought at the time to belong to a Phycomycete. The following year Mr. Pazzi again sent specimens from the same area. These were referred to a student of Phycomycetes, but without a full knowledge of the life-cycle of the fungus this person rightly would not commit himself to an identification, replying that although the fungus appeared to be a Phycomycete even the youngest galls lacked stages of the fungus prior to the formation of resting-spores.

A morphologically identical fungus in similar galls on the roots of *Trianthema pentandra* was collected by Mr. B. N. Wolff near Malati in 1945. The subject was then dropped until 1953, when the writer became interested and endeavoured to locate fresh material to study, beginning his search at the Botanical Reserve, Pretoria University Farm, which is close to Brummeria. This report deals only with the galls on *Limeum viscosum* from the Botanical Reserve, and on *L. glomeratum* from Brummeria. Miss M. Henderson kindly identified the host plants.

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* *Entorrhiza calospora* sp. nov.

Sori radicicoli, tumores globosi vel elongati usque ad 3·5 cm. diam. inducentes. Hyphae intracellulae, hyalinae, 1·0–2·6 μ diam., tenuissime tunicatae, apice ramulorum lateralium chlamydosporas magnas generantes. Chlamydosporae globosae, hyalinae vel luteae, binucleatae, 17·4–22 μ diam.; episporio verrucis prominentibus, 1·3–3 μ crassis, 2–4 μ altis, exornato. Hab. in radicibus *Limei glomerati*, *L. viscosi*, *Trianthemae pentandrae*. Typus: Herb. Pretoriae No. 33770, leg. *J. J. O. Pazzi*.

Limeum viscosum is common on the ridge included in the Botanical Reserve, and was abundant for a season on a patch of ploughed sandy soil west of the ridge. Later, veld grasses invaded the ploughed soil and ousted the *Limeum* plants. The host plant also grew along a little-used road on the south-east side of the ridge. From all these sites *Limeum* plants were dug up and a rather small proportion of them bore the galls that were being sought. The presence of the galls could not be inferred from the aboveground appearance of the plants. On the other hand most *Limeum* plants at the Reserve had insect-galls or thickenings at the collar or on the stems. Sections of these thickened tissues were free of fungus but occupied by insect larvae.

Limeum viscosum is an annual herb of prostrate, procumbent or decumbent habit, and favours cultivated or disturbed sandy soils. According to herbarium records, it is commonest on sandy or gravelly soils. Fungus-galls are more easily found on those plants growing in deep sand where the roots are better developed than in shallow gravelly soils.

Phillips (1951) places *Limeum* in the Phytolaccaceae and *Trianthema* in the Aizoaceae, two adjacent families in the classification he adopts. In *Limeum* he notes eight species widely distributed in South Africa, while in *Trianthema* there are four species, some of which occur in each Province.

When the writer began this work the following herbarium specimens of the fungus-galls were available in the National Herbarium: 33770, *Pazzi*, on *Limeum glomeratum*, Brummeria, 1943; 35291 and 35391, *Pazzi*, on *L. glomeratum*, Brummeria, Spring 1944; 39031, *Wolff*, on *Trianthema pentandra*, Mahale, P.O. Malati, 1945. In the phanerogamic section of the National Herbarium, the writer found a specimen of *Limeum glomeratum* collected by *H. B. Terry*, 30/1/1943, *sine loc.*, with typical galls on its roots. Finally specimens have been received from Ficksburg, O.F.S., on *L. viscosum* collected by *Dr. Meredith*, March, 1955.

With the preconceived idea that the fungus was a Phycomycete, the writer spent some time collecting galls of all sizes and dissecting, sectioning and examining them in an attempt to trace stages of a Phycomycete life-cycle, but only mycelium and resting-spores were found. He accumulated a good deal of information about these without coming any nearer to classifying the fungus, and all attempts at germinating the chlamydospores failed. Then a paper by Schwartz (1910) came to hand, and at once the imposing similarity between the *Limeum* fungus and *Entorrhiza* was evident.

Technique.

The freshly collected galls were fixed in the field and sectioned after embedding in paraffin. The following fixatives were tried: Formol-alcohol, Carnoy, Gilson, Bouin, and Chicago Chrome-acetic-osmic acid, according to the formulae given by Chamberlain (1915). Fixation for two hours in Carnoy or twenty-four hours in Bouin gave satisfaction, the latter possibly being the better.

Paraffin sections were cut in thicknesses between 3 μ and 15 μ. Sections about 7 μ thick were generally the most useful, but those at 3 μ were necessary for seeing the contents of the chlamydospores. The mycelium was of course only seen in short lengths in the sections, and was best studied by teasing out coarse hand sections mounted in warmed lactic acid with cotton blue as stain, or in Cartwright's picro-aniline blue (Cartwright, 1929). The stained, teased out portions were washed and mounted in lactic acid. The cover glass was ringed with nail lacquer. In such preparations the mycelium was easily seen but its cytological details were not clear.

Fifteen common stain combinations were tested on the paraffin sections. Many gave pleasing colour combinations but insufficient cytological detail. The cytology was well shown, however, by using Heidenhain's haematoxylin with a light counterstain of Orange G, or with Giemsa stain, or with Safranin O counterstained with Delafield's haematoxylin. In the last combination it was found that after differentiating the haematoxylin in acid alcohol it was desirable to intensify the remaining coloration

with ammonia alcohol to bring out the colour in the hyphae and host nuclei satisfactorily. Used in this way, Safranin and Delafield's haematoxylin was perhaps the best of the combinations tested.

Description of the Galls and of *E. calospora*. (Figs. 1–38).

The galls measure less than 0·5 mm. to 3·5 cm. in diameter. The smaller galls are rounded and more or less smooth. They may be formed laterally on a rootlet, or may surround the root thus later interrupting the continuity of the conducting system. A laterally formed gall may often have only the slightest connection with the root, whose structure then remains quite unimpaired. Here one is reminded of the galls of *Sorodiscus radicicolus* described by Ivimey Cook (1931) except that in the *Entorrhiza* galls the youngest stages of the fungus are not necessarily found adjacent to the root. Mycelium and young chlamydospores were present even in the smallest galls. A root may bear a linear series of galls which coalesce on further growth into an irregularly elongated mass. Some of the larger galls are obviously formed like this, but others with an irregularly globose form and a tubercular surface are apparently formed by prolonged growth of a single gall.

The galls consist of parenchyma cells and interrupted conducting tissues. The host nuclei are somewhat enlarged and clearly seen in young galls, but later disappear. The interior of an old gall is pale yellowish, marbled or granular, owing to innumerable chlamydospores occupying practically all the parenchyma cells. A dusty sorus is not produced. Scattered and displaced Xylem elements may be present depending upon the degree of root involvement, but the Xylem never contains chlamydospores or mycelium. A very thin peripheral layer of suberised tissue may surround old galls.

The galls of *E. calospora* are far larger than those of any other species of *Entorrhiza*. Descriptions of other species mention galls tending to be ovoid, cylindrical, or digitate, and none measuring more than 3 mm. wide and 10 mm. long.

The hyphae of *E. calospora* are colourless, 1·0–2·6 μ in diameter, with very thin walls. They are intracellular, but may perhaps be intercellular too, though this condition was not seen. The hyphae are often continuous with the cell walls of the host. Within the cells they are sharply and irregularly bent at intervals, or spirally coiled. Coiled hyphae are typical of those bearing chlamydospores. The coiled and contorted hyphae form unentangleable masses which commonly enmesh the host nucleus, and so close is their connection that the hyphae may appear to arise from the host nuclei. The hyphae vary very much in diameter over short distances. Their contents are difficult to observe as they resist differential staining and their alternately strongly and weakly refractile zones appear respectively under- and overstained. Minute dark-staining granules, possibly nuclear material, are scattered in the hyphal cytoplasm which is itself either dense or vacuolate. The hyphae are sparingly branched, with occasional septa, and the chlamydospores are formed singly and terminally on lateral branches, which are somewhat narrower than the purely vegetative mycelium.

The chlamydospores are pale lemon to golden in a dried mass when mature, but appear almost hyaline and strongly refractile in the microscope. Early in their development, as soon as they are recognisable as spores, they are more or less globose with a lobed outline of strongly refractile warts. The warts are scanty at first but later cover the whole surface and become very conspicuous. The mature chlamydospores are globose, 17·4–22 μ in diameter (including the warts). The warts are 2–4 μ high and 1·3–3 μ broad at the base. They are cylindrical or conical with a rounded apex which is narrower than the base. Some rather dark chlamydospores have warts which differ in being abruptly narrowed towards the apex. The wall of the chlamydospore

totals 3·3–4·7 μ in thickness and consists of three layers, the outermost warted layer and two smooth inner layers. Refractile (? oily) masses or vacuolate cytoplasm fills the chlamydospore. Two relatively large nuclei, 1·3 μ diameter, are present in the mature spores, and the vacuolate cytoplasm often carries a few small dark-staining granules. As many as twenty chlamydospores have been seen in a single host cell; the average number is 4–5 per cell. The greater numbers occur in greatly enlarged cells. It is possible that the latter are formed by the breaking down of the intervening walls of several smaller cells, but only in one instance was this clearly seen. The immature chlamydospores stain deeply with all the common stains; the mature ones are more resistant to stains but show up well on account of their refractility.

Galls appear in early spring and continue to grow, new galls also being formed, throughout the summer. In the autumn, about March, the host plants begin to die and the galls dry out and quite rapidly disintegrate into a powder composed of aggregations of chlamydospores and pieces of the softer host tissues, often stranded together by the more resistant Xylem elements of the host.

Germination Experiments.

In the foreword to Ainsworth & Sampson's " British Smut Fungi ", 1950, the Director of the Commonwealth Mycological Institute wrote, " The compilation of this monograph focuses attention on the gaps in our knowledge of the germination of many of the species and it is hoped that its publication will stimulate interest in this group of fungi, which is of such great importance to agriculture." In the text of the book, the authors write of *Entorrhiza* (p. 88), " Spore germination is not well known . . . "

The writer has tried several times to germinate the chlamydospores of *E. calospora* using spores taken from fresh material, from newly disintegrated galls and from disintegrated galls which have been placed in a refrigerator for one month at 8° C. in an attempt to simulate overwintering. After refrigeration some of the material was also left at room temperature for the months of June–August inclusive. The refrigerated galls were divided into two batches kept respectively in dry and moist sand. Hanging drop cultures in water, acidified water, and Czapek solution were made, and chlamydospores deposited in a thin film on slides were exposed to alternately wet and dry atmospheres, but none of these methods resulted in germination after four weeks. The spores that were used appeared to be mature but this point certainly merits further investigation. Work on germination is continuing.

Synopsis of the genus *Entorrhiza* C. Weber.

This genus was erected by Weber (1884) to accommodate the smut described by Magnus (1878) as *Schinzia cypericola*, which causes root swellings on *Cyperus flavescens*. The genus *Schinzia* Naegeli (Naegeli, 1842) had been based on two uncertain species found in *Iris* roots, and moreover was a later homonym of *Schinzia* Dennstätt (1818). *Entorrhiza cypericola* (Magn.) Weber is thus the type species of the genus *Entorrhiza*. But in his work, Weber wrongly attributed the root swellings on *Cyperus flavescens* and *Juncus bufonius* to the single species *E. cypericola*, and his biological observations were made on the material of *Juncus bufonius*. Magnus (1888) corrected this error by showing that the smut on *C. flavescens* had finely reticulate or punctate spores, whereas that on *J. bufonius* differed in having coarsely warted spores. Still accepting the genus *Schinzia*, Magnus named the smut on *Juncus* as *Schinzia aschersoniana* Magn. In Aug. 1888 Lagerheim (1888) made the combination *Entorrhiza aschersoniana* (Magn.) Lagerh. and was followed independently in this by De Toni in Oct. 1888 (De Toni, 1888).

Nine species described or combined under *Entorrhiza* have been traced in the literature, namely:—

E. cypericola (Magnus) Weber in Bot. Zeit. 42 (1884) 370.
= *Schinzia cypericola* Magnus in Verh. bot. Vereins Brandenburg 20 (1878) 53; Magnus in Ber. deutsch bot. Gesellsch. 6 (1888) 102.

E. aschersoniana (Magnus) Lagerheim in Hedwigia 27 (1888) 262.
= *Schinzia aschersoniana* Magnus in Ber. deutsch bot. Gesellsch. 6 (1888) 103.
= *E. cypericola* (Magnus) Weber, *pro parte*, in Bot. Zeit. 42 (1884) 370.

E. casparyana (Magnus) Lagerheim in Hedwigia 27 (1888) 262.
= *Schinzia casparyana* Magnus in Ber. deutsch bot. Gesellsch. 6 (1888) 103.

E. digitata Lagerheim in Hedwigia 27 (1888) 264.

E. cellulicola (Naegeli) De Toni in Saccardo Syll. Fung. 7 (1888) 498.
= *Schinzia cellulicola* Naegeli in Linnaea 16 (1842) 281.

E. solani Fautrey in Rev. de Myc. (1896) 11.

E. scirpicola (Correns) Sacc. & Syd. in Saccardo Syll. Fung. 14 (1899) 425.
= *Schinzia scirpicola* Correns in Hedwigia 36 (1897) 40.

E. caricicola Ferdinandsen & Winge in Dansk Bot. Arkiv. 11 (1914) 10.

E. raunkiaeriana Ferdinandsen & Winge in Dansk Bot. Arkiv. 11 (1914) 8.

Of the above, *E. cellulicola* in *Iris* roots and *E. solani* in *Solanum tuberosum* are doubtful members of the genus. Until now, all species referred with certainty to *Entorrhiza* have been found exclusively on members of the Juncaceae and Cyperaceae. *E. casparyana* with globose, strongly verrucose chlamydospores 17–22 μ diameter, is the only one sufficiently like the fungus in *Limeum* root galls to require close comparison. It is doubtful if authentic material of *E. casparyana* exists. In these circumstances, and also in view of the difference in host families, the writer was advised by Dr. M. B. Ellis of the Commonwealth Mycological Institute to describe the fungus on *Limeum* as a new species. Such treatment is in accordance with the species concept in Smut fungi recently proposed by Fischer & Shaw (1953), whose views are summarised as follows (in Rev. Appl. Myc. 33, 1954, 116): "Any two or more smuts of similar morphology and symptomatology, parasitising different species and genera of the same host family, would be regarded as belonging to one morphological species. On the other hand, smuts of comparable morphology attacking members of different host families would be deemed distinct species." As a practical convenience this treatment has much to commend it. Nevertheless, the writer is disinclined to propose yet another new species for the *Entorrhiza* present in *Trianthema* when it is so patently indistinguishable from that in *Limeum*.

Other parasitic fungi of *Limeum viscosum* roots.

Some *L. viscosum* plants potted with their own soil at the Botanical Reserve were kept in the laboratory to watch the development of galls known to be on their roots. During subsequent transfer of one plant to another pot, some of its rootlets were sampled to see whether the root hairs might contain sporidia of *Entorrhiza*. These were not seen, but instead the following fungi were found: (1) a single rootlet infected with *Ligniera junci* (Schwartz) Maire & Tison; (2) abundant rootlets heavily infected with *Olpidium brassicae* (Woronin) Dang.; (3) several hypertrophied root hairs infected with an unidentified Phycomycete in the resting-sporangium stage; (4) a rootlet with a perithecium of *Chaetomium* adhering to it; (5) several roots bearing a mantle of sterile mycelia, both brown and hyaline. The sterile mycelia and the *Chaetomium* were evidently only fortuitously associated with the rootlets and were not investigated further. The first two parasitic fungi mentioned above are now described.

Ligniera junci (Schwartz) Maire & Tison in Comptes Rendus Acad. Sci. Paris 152 (1911) 206, Ann. Mycol. 9 (1911) 235; Ivimey Cook in Trans. Brit. Myc. Soc. 11 (1926) 196–213, Pl. 8, Archiv für Protistenkunde 80 (1933) 222–227, Pl. 11; Karling, The Plasmodiophorales (1942) 60, Pl. 11.

Sorosphaera junci Schwartz in Annals of Bot. 24 (1910) 512, Pl. 40. See Figs. 39–41.

A small lateral rootlet was seen with twelve cystosori in the cortical tissues. The root was not hypertrophied. The cystosori appeared solid and were globose or ellipsoidal. They were rather small, the largest measuring 17 × 22 μ. They consisted of closely aggregated resting spores lacking a common membrane. In the smallest cystosorus ten resting spores were visible, in the largest twenty-five, but other spores were hidden behind those that could be seen. The resting spores were 3·8–6·1 μ in diameter, and varied somewhat in shape. Basically they are globose but the central ones become angled and the peripheral ones wedge-shaped by compression. Some of the peripheral spores have a slightly concave outer wall giving them a bluntly bicuspid appearance. Such spores are illustrated in figs. 14, 15, 17, 20 of Schwartz's paper (Schwartz, 1910, loc. cit.). The spore walls are smooth, very thin and hyaline. No zoosporangia or other stages in the life-cycle were seen in the very limited material available.

The form of the cystosori was not well shown in the single preparation in which this fungus was found, but there can be little doubt of its identity with *Ligniera junci*. Our knowledge of the life-cycles, host relationships and taxonomy of the species of *Ligniera* is quite fully covered in the literature cited above. Probably only two good species of *Ligniera* are known (Cook, 1933), namely *L. junci* and *L. verrucosa* Maire & Tison, the latter having verrucose resting spores. Karling (1942) however, includes a further two species, *L. pilorum* Fron & Gaillat and *L. isoetes* Palm, which he regards as possibly distinct from *L. junci*.

L. junci attacks many different hosts, and consequently has been described under several different names. Cook (1933, p. 227) lists the recorded hosts of *L. junci* and concludes, rather sweepingly, " From such a variety of hosts it seems probable that this fungus is able to infect any vascular plant under suitable environmental conditions."

Olpidium brassicae (Woronin) Dangeard in Ann. Sci. Nat. Bot. ser. vii, 4 (1886) 242–343; Sampson in Trans. Brit. Myc. Soc. 23 (1939) 199–205, figs. 1–22, Pl. 5.

Chytridium brassicae Woronin in Jahrb. Wiss. Bot. 11 (1878) 548–574. See figs. 42–51.

Abundant material was found consisting of solitary or aggregated zoosporangia occupying the cortical tissues of small lateral roots without causing hypertrophy. Zoosporangia globose, 12·5–70 μ diam., or elongated 10–36 × 32–194 μ, with homogeneous or large globular contents, thinwalled or sometimes somewhat thickened. Exit tubes of the zoosporangia are 2·9–8·0 μ diameter and 4·6–23 μ long depending on the distance to the exterior of the host. Zoospores more or less globose, about 3 μ diam. (with a single flagellum up to 17 μ long fide Sampson, loc. cit.). Resting sporangia (cysts) are angular-globose, 13·6–28·5 μ diam., or sometimes elongated and then angular-ellipsoid up to 22 × 29 μ, with an exospore which is coarsely and deeply ridged giving a stellate appearance in optical section, with 7–9 points to each star; endospore smooth, thinwalled.

Our material did not show the full life-cycle of this fungus, nor any sporangia bearing more than one exit tube. Preparations stained with Heidenhain's haematoxylin showed the ridges of the cysts very well and we were able to confirm Miss Sampson's observations on their morphology. Miss Sampson has made an excellent case for

reducing *Asterocystis radicis* De Wild., *Olpidium borzii* De Wild., *Olpidium radicicolum* De Wild., and *Olpidiaster radicis* (De Wild.) Pascher to synonymy with *Olpidium brassicae*. The reader is referred to her paper for an authoritative account of the life-cycle, morphology and taxonomy of *Olpidium brassicae*, and to another paper (Sampson, 1932) for differentiation of the species of *Olpidium* which have been recorded on higher plants.

As neither *Ligniera junci* nor *Olpidium brassicae* had previously been recorded in South Africa, attempts were made to secure further material by planting cauliflower seeds in the soil from which these fungi had been isolated. The seedlings were kept rather wet, which favours the development of *O. brassicae* according to Miss Sampson, but they remained uninfected.

Perhaps the greatest interest concerning this discovery of *L. junci* and *O. brassicae* lies in their association in the roots of a single plant, which also bore *Entorrhiza* galls. We believe that *L. junci* and *Entorrhiza* have not been recorded in association with one another since *L. junci* was originally described (Schwartz, 1910, as *Sorosphaera junci*), when it occurred with species of *Entorrhiza* in the roots of *Juncus bufonius*, *J. articulatus* and *J. lamprocarpus*. On the other hand, associations of *Ligniera* spp. with *Olpidium brassicae*, and of other Plasmodiophoraceae and chytrids, are well documented (Maire & Tison, 1911, b, pp. 241–242; Guyot, 1927; Ivimey Cook, 1927, 1933; Bartlett, 1928; Fitzpatrick, 1930, pp. 62–63; Karling, 1942, pp. 64–68). Often such fungi were found occupying the same tissues in a single root and not unnaturally were thought to be a single organism in various stages of development. Thus certain species and genera were proposed (e.g. *Rhizomyxa hypogaea* Borzi, *Sorolpidium betae* Němec and *Anisomyxa plantaginis* Němec) which now appear to have been based on the accidental association of two different species. The identities of some of the component fungi of such " mixed species " are still debated, but it is now generally accepted that the infection is indeed a mixture of species and not a single organism in various developmental stages. Cook (1933, p. 241), giving several examples of associated chytrids and Plasmodiophoraceae, states, " The use of *Sorolpidium betae*, *Anisomyxa plantaginis* and *Rhizomyxa hypogaea* as evidence of a relationship between Plasmodiophoraceae is unsatisfactory as these species are mixtures." No one who has seen this phenomenon of mixed infection is likely to contest Cook's statement.

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Explanation of the Figures.

Figs. 1–38: Stages in the development of *Entorrhiza calospora*.

Figs. 1, 2, 6, 11, 13, 14, 15, 17, 34, show the relationship of the host cell nucleus and the hyphae. Note that the host nucleus is often enmeshed by a tangled knot of hyphae.

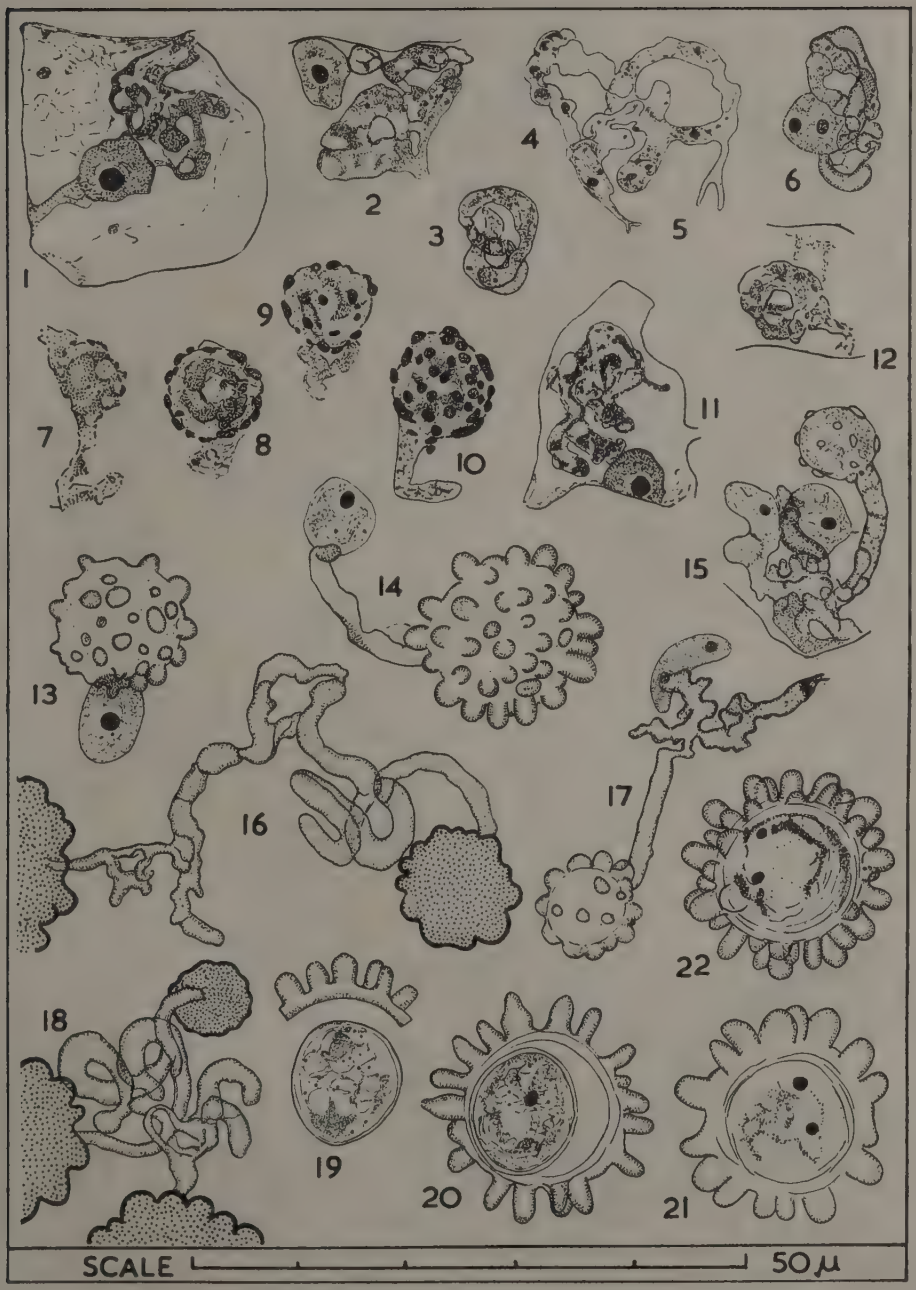
Figs. 1–6, 10–12, 14–18, 25–38, show the hyphae of abruptly bent and contorted form. The characteristic spiral coiling of the hyphae is seen in figs. 16, 28, 32, 33, 38. Hyphae knotted into unentangleable masses are depicted in figs. 1, 2, 6, 11, 15, 17, 18.

Fig. 24 represents a host cell containing seventeen chlamydospores and presents the only evidence seen of fusion between adjacent cells to form larger ones containing the greatest numbers of chlamydospores.

Figs. 7–10, 13–18, 25–38, trace the development of the chlamydospores. The youngest chlamydospores, globose with an indented, sparsely verrucose outline are seen in figs. 7–10, 25–30, 33, 37, 38. Older stages with strongly verrucose exospores are also shown in some of these and in the remaining illustrations of the chlamydospores. Figs. 19–22 depict mature chlamydospores in section, showing the wall structure and contents. The binucleate condition of the chlamydospores is shown in figs. 19–20.

Figs. 39–41: Cystosori of *Ligniera junci* composed of closely aggregated resting spores.

Figs. 42–51: Stages in the life-cycle of *Olpidium brassicae*. Zoosporangia with exit tubes are shown in figs. 42–45, 47–50. Young zoosporangia without exit tubes are seen in figs. 45–46. Stellate resting sporangia (cysts) are depicted in fig. 51.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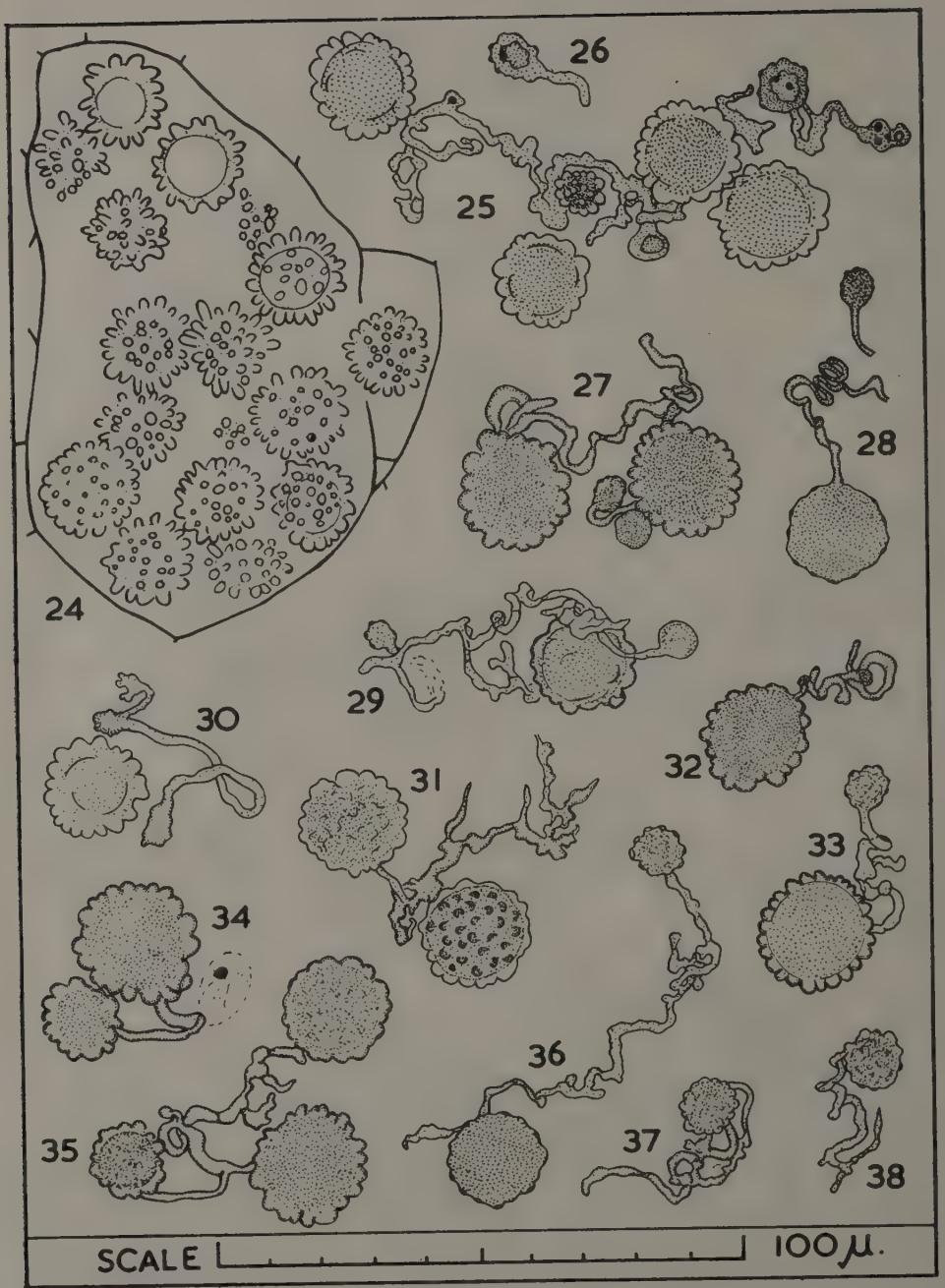
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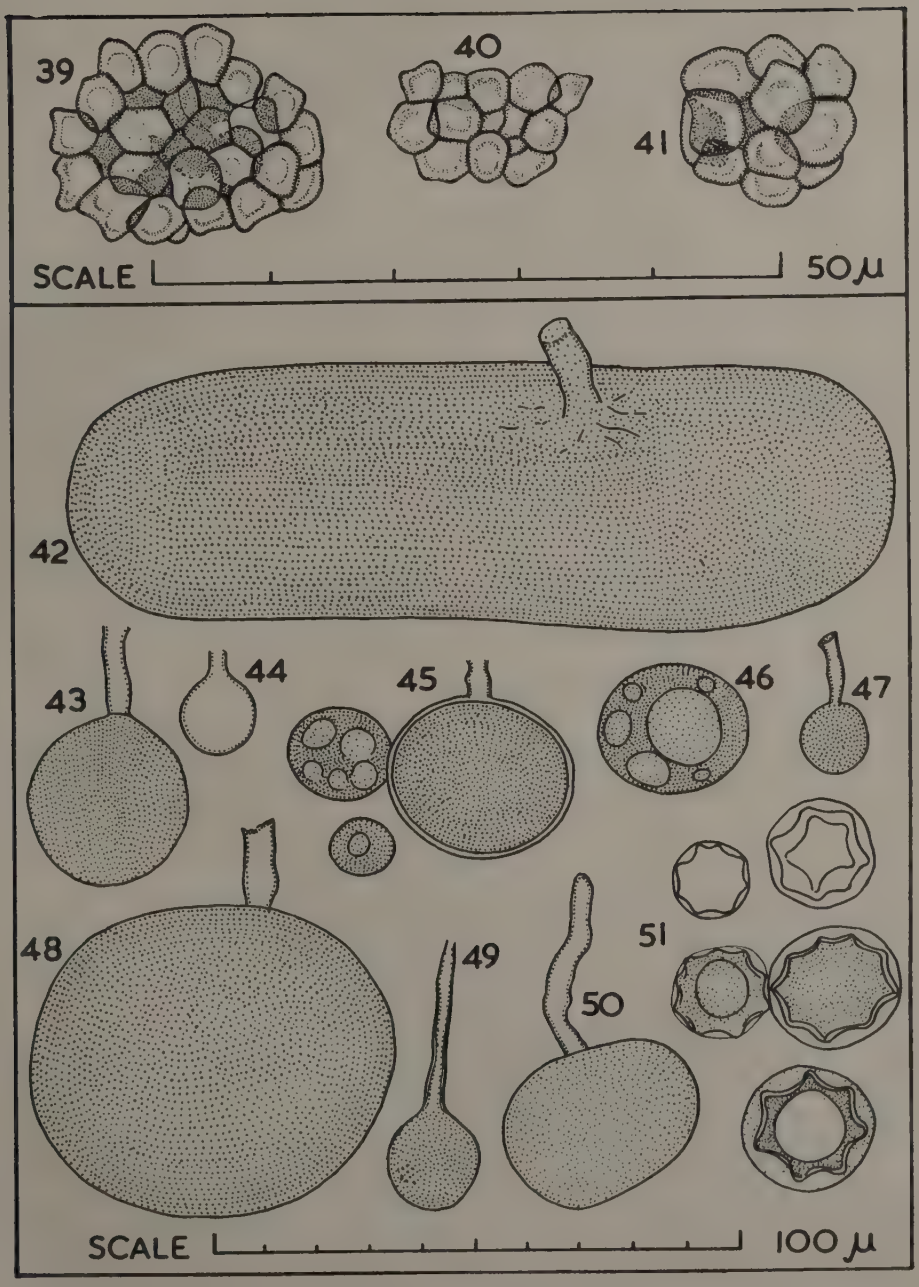
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The Cyphelloid Fungi of South Africa.

By

P. H. B. Talbot.

The recorded species of South African cyphelloid fungi are examined in this paper. These are included in the genera *Aleurocystus*, *Aleurodiscus*, *Cyphella*, *Cytidia*, *Dendrothele*, *Gloeosoma*, *Porotheleum*, *Solenia* and *Stigmatolemma*, some of which are invalid names requiring comment. These genera, with several others, have been classed among the families Thelephoraceae, Cyphellaceae and Leptotaceae, but similarities in their structure permit of their treatment together as " cyphelloid fungi ", until such time as their true relationships have been clarified.

Extensive use has again been made of Doidge's check-lists of South African fungi (in Bothalia 5, 1950). Herbarium numbers, unless otherwise stated, refer to specimens in the National Herbarium, Pretoria. Genera and species are considered in alphabetical order. Synonyms or doubtful records are printed in italics, and accepted species in bold face. Keys to the accepted species are given at the end of the paper.

Grateful thanks are due to Dr. Wm. Bridge Cooke for reading the manuscript, suggesting some alterations that have now been made, and generously allowing publication here of two new species that he has described from South African material. Some peculiarities of nomenclature that remain in the paper are the author's responsibility and are explained in the appropriate places.

The writer is indebted to the following for the loan of specimens: The Curator of Fungi, Smithsonian Institution; The Director, Royal Botanic Gardens, Kew; The Director, Muséum National D'Histoire Naturelle, Paris. The Trustees of the P. A. van der Byl Herbarium, University of Stellenbosch, kindly authorised a visit to the Herbarium to examine specimens in their keeping.*

ALEUROCYSTUS Lloyd.

Aleurocystus Lloyd (as McGinty) in Lloyd Myc. Notes 6 (1921) 1088, *nomen provisiorum*. Further referred to in: Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 42; Martin in Lloydia 5 (1942) 162; Donk in Reinwardtia 1 (1951) 204–206.

Donk (loc. cit.) reasons that the names mischievously proposed by Lloyd under the pseudonym " N. J. McGinty " are to be regarded as *nomina provisioria*, and that under Art. 37 of the International Rules of Botanical Nomenclature their publication was invalid. This is certainly so regarding *Aleurocystus*, which Lloyd only suggested *could* be a segregate based on *Aleurodiscus capensis*, whose texture and cystidia set it apart from other species of *Aleurodiscus*. Donk also holds that Stevenson & Cash's (loc. cit.) reference to *Aleurocystus* amounts to " incidental mention ", and again does not constitute valid publication under the same Article of the Rules. Stevenson & Cash listed the combination *Aleurocystus capensis*, attributing it to Lloyd who, however, made it only by implication and not literally.

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* Deur die goedgunstigheid van die Universiteit van Stellenbosch is 'n geleentheid aangebied om eksemplare in die Herbarium P. A. van der Byl te ondersoek. Vir sy hoflikheid en hulp gedurende my besoek wil ek graag dr. J. G. Smith bedank. Verdere verwysing na verskillende soorte in die van der Byl-Herbarium word hieronder gemaak.

It seems clear that the names *Aleurocystus* and *Aleurocystus capensis* are *nomina provisioria* and therefore invalid. For *Aleurocystus capensis* see under **Cytidia habgallae** (B. & Br.) Martin.

ALEURODISCUS Rabenh. ex J. Schroet.

Aleurodiscus acerinus (Pers. ex Fr.) Höhnel & Litsch. in K. Akad. Wiss. Wien Sitzungsb. 116 (1907) 804, Tab. 2, f. 6; Doidge loc. cit. p. 479.

Corticium acerinum Persoon, Obs. Myc. 1 (1796) 37.

Thelephora acerina (Pers.) Pers. ex Fr., Syst. Myc. 1 (1821) 453, Hym. Eur. (1874) 648; Persoon, Syn. Fung. (1801) 581, Myc. Eur. 1 (1822) 152; Léveille in Ann. Sci. Nat. ser. iii, 5 (1846) 150.

Stereum acerinum (Pers. ex Fr.) Fr., Epicrisis (1838) 554; Saccardo Syll. Fung. 6 (1888) 587.

Saccardo's reference to South African material does not specify a collection or locality, and cannot be traced further. Léveille published Drège 9452 from the Cape as *Thelephora* (*leijostroma*) *acerina* Pers. This collection is not deposited in the Paris Natural History Museum, and consequently it has not been possible to decide whether the species is represented in South Africa. The species differs from the variety *A. acerinus* var. *alliaceus* in the size and particularly the shape of its spores. *A. acerinus* has spores which are ovoid, with a ratio of length/width of about 1·6 (always less than 2·0), and a size of 5·6–6·4 × 8·0–12 μ (6–7 × 10–13 μ fide Höhnel & Litschauer).

Aleurodiscus acerinus (Pers. ex Fr.) Höhnel & Litsch. var **alliaceus** (Quél.) Bourd. & Galz. in Bull. Soc. Myc. de Fr. 28 (1912) 352, Hym. de Fr. (1928) 334; Pilát in Ann. Myc. 24 (1926) 217, Tab. 15, f. 11.

Corticium alliaceum Quélet, F. Myc. de Fr. (1888) 5; Saccardo Syll. Fung. 6 (1888) 629.

Aleurodiscus acerinus (Pers. ex Fr.) Höhnel & Litsch. var *longisporus* Höhnel & Litsch. (!) in K. Akad. Wiss. Wien Sitzungsb. 116 (1907) 805, Pl. 2, f. 4; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 25; Doidge loc. cit. p. 479; Talbot in Bothalia 6 (1951) 26, Pl. 18.
FIG. 1.

Since seeing more material of the Type of *A. acerinus* var *longisporus* (viz. MacOwan 1074, distributed under Nos. 20840 and 21947 in the National Herbarium, Pretoria) the writer has found it necessary to emend the description and comments given previously on this variety (Talbot, 1951, loc. cit.). Further, accepting the synonymy of *A. acerinus* var. *longisporus* and *A. acerinus* var. *alliaceus*, the latter name should be used as it has priority.

After much search, eight spores were found in the Type of var. *longisporus*. These measured 4–8 × 9–17·6 μ (smallest 4 × 9 μ; two largest 8 × 16 μ and 6·4 × 17·6 μ). They were long-elliptical, or almost cylindrical, with one side usually somewhat depressed. Their length was 2·0–2·8 times as great as their width. In European material of *A. acerinus* spores were found to have a length 1·4–1·9 times as great as their width. Literature records of the spore measurements of the species and its varieties were analysed, with the following results:—

A. acerinus: Ratio length/width = 1·4–1·8: average 1·6.

A. acerinus var. *longisporus*: Ratio length/width = 1·9–2·9: average 2·4.

A. acerinus var. *alliaceus*: Ratio length/width = 2·0–2·5: average 2·25.

It appears from this that the spores of *A. acerinus* are more ovoid (besides being usually shorter) than those of the varieties *longisporus* and *alliaceus*, thus substantiating a varietal difference from the main species. Also it is evident that the spores of the two varieties have essentially the same shape and order of size, and that only one variety, *alliaceus* being its prior name, is merited.

If only the size ranges of these various spores are taken into account, and their shape (i.e. ratio length/width) is disregarded, then the spores of the main species may fall within the size range of the spores of the varieties, and the erection of varieties would be questionable. For example, the spores of *A. acerinus* have a range of 6–7 × 10–13 μ (fide Höhnel & Litschauer) which lies within the range of 4–8 × 9–17·6 μ measured by the author for spores of *A. acerinus* var. *longisporus*. Yet the spore shapes are distinct and the varietal difference is legitimate.

An emended description of *A. acerinus* var. *alliaceus* follows:—

Fructifications resupinate, irregularly expanded, crustose, adnate, chalk-white becoming pallid ivory-white, finely and closely cracked, having a determinate margin; in section up to 80–100 μ thick.

Basidia: cylindrical to subclavate with a wavy outline, 35–60 × 5–8·5 μ, with 2 or 4 sterigmata.

Spores: long elliptical, often with one side flattened, or subcylindrical, more than twice as long as broad, 4–8 × 9–17·6 μ, smooth, hyaline.
Paraphyses: (1) basidia modified into pseudophyses which are bulbous with a short to long, narrow, apical outgrowth; 10–15 × 25–35 μ, with the outgrowth up to 16 × 3 μ, (2) racemosely branched paraphysoids (dendrophyses) between and beyond the basidia, very heavily encrusted with minerals, extensions of the hyphal system, 2 μ or less in width.

Hyphae: 2 μ or less in width, hyaline, erect, much branched and closely arranged in the basal part, very heavily encrusted, emerging as dendrophyses.
Specimens examined: 20840, 21947 (both MacOwan 1074, type of *A. acerinus* var. *longisporus*). Two other collections, 27566 and 39058 may belong here, but no spores were seen with certainty.

Aleurodiscus acerinus (Pers. ex Fr.) Höhnel & Litsch. var. *longisporus* Höhnel & Litsch. (!) in K. Akad. Wiss. Wien Sitzungsb. 116 (1907) 805, Pl. 2, f. 4; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 25; Doidge loc. cit. p. 479; Talbot in Bothalia 6 (1951) 26, Pl. 18.

= **Aleurodiscus acerinus** (Pers. ex Fr.) Höhnel & Litsch. var. **alliaceus** (Quél.) Bourd. & Galz. See previous entry.

Aleurodiscus botryosus Burt in Ann. Mo. Bot. Gard. 5 (1918) 198, f. 10; Bourdot & Galzin, Hym. de Fr. (1928) 332, f. 102.

FIG. 3.

Fructifications effused, resupinate, thin firmly adherent, white then later straw-coloured, smooth, becoming cracked when old into small areas; margin similar, thinning out to pruinose. Up to 360 μ thick in section. Fructifications sometimes confluent.

Basidia: none seen mature, clavate, 60–70 × 8–10 μ when immature.
Spores: hyaline, smooth, broad elliptical to ovoid, amyloid, 13·5–15 × 7·5–8 μ.
Gloeocystidia: embedded in stages from the basal tissues to the hymenium, thinwalled, with yellowish granular or homogeneous contents, subcylindrical, flexuous, or clavate or pyriform, 50–110 × 9–17–(20) μ.

Paraphyses: dendrophyses of a peculiar type found in the hymenium and in lower tissues composed of a short main axis 1·5–4 μ diam., with short lateral branches bearing minute spherical granules which show a strong amyloid reaction.
Minerals: abundant throughout.

Hyphae: thinwalled, hyaline, 2–2·5 μ diam., suberect, no clamps seen.
Specimens examined: Universiteit van Stellenbosch, Herbarium P. A. van der Byl nr. 2261, Knysna (as *Aleurodiscus cerussatus*).

The presence of yellowish gloeocystidia and dendrophyses together, distinguishes this species from other *Aleurodiscus* species so far seen in South Africa. This fungus differs from *A. cerussatus*, where v. d. Byl placed it, mainly in the nature of its dendrophyses occurring throughout the tissues and bearing amyloid granules.

The accessory organs of *A. cerussatus* are to be classed rather as acanthophyses (bottle-brush paraphyses) than dendrophyses, and are confined to the hymenium. *Aleurodiscus roseus* is distinguished by the rose-coloured hymenium, lack of gloeocystidia, presence of clamp connections and presence of normal type of dendrophysis with large, irregular branches.

Aleurodiscus capensis Lloyd (!) in Lloyd Myc. Notes 6 (1920) 930, fig. 1687, ibid. 6 (1921) 1088; Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 43; Doidge loc. cit. p. 484.

On examination of the type specimen (v. d. Byl No. 833 in the Lloyd Mycological Collection No. 34029), the writer agrees with Martin (in Lloydia 5, 1942, 161–162) and W. B. Cooke (in Mycologia 43, 1951, 208–209) that this species must be referred to **Cytidia habgallae** (Berk. & Br.) Martin.

Aleurodiscus cerussatus (Bres.) Höhnel & Litsch. in K. Akad. Wiss. Wien Sitzungsb. 116 (1907) 807, Pl. 4, f. 1; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 25, f. 8; Doidge loc. cit. p. 479.

The specimen on which this record is based is Universiteit van Stellenbosch, Herbarium P. A. van der Byl nr. 2261, Knysna. This specimen is considered to be **Aleurodiscus botryosus** Burt, and consequently *A. cerussatus* should be omitted from South African lists.

Aleurodiscus corneus (Lloyd) Lloyd (!) in Lloyd Myc. Notes 6 (1920) 930, f. 1688; Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 43; Doidge loc. cit. p. 484.

Cytidia cornea Lloyd (!) in Lloyd Myc. Notes 5 (1917) 656, figs. 935–937; Doidge loc. cit. p. 484.

On examination of the type of this species, Duthie 154 in the Lloyd Mycological Collections No. 34063, the author agrees with Martin (in Lloydia 5, 1942, 161) and W. B. Cooke (in Mycologia 43, 1951, 208) that the species should be referred to **Cytidia habgallae** (Berk. & Br.) Martin.

Aleurodiscus disciformis (DC. ex Fr.) Patouillard in Bull. Soc. Myc. de Fr. 10 (1894) 80; Burt in Ann. Mo. Bot. Gard. 13 (1926) 305; v. d. Byl in Ann. Univ. Stellenbosch 7 (1929) 24, f. 7; Doidge loc. cit. p. 479.

Thelephora disciformis DC. ex Fr., Syst. Myc. 1 (1821) 443.

FIG. 4.

Fructifications effused, resupinate, white, eventually greyish or yellowish and cracked. Section about 500 μ thick.
Basidia: 12·5–21 × 65–100 μ, long-clavate, with 2–4 sterigmata up to 2–3 μ wide and 10–20 μ long.

Spores: hyaline, smooth, 18–22 × 12·5–16 μ, amyloid, ovate to subglobose, sometimes showing a distinct apiculus.

Paraphyses: (1) gloeocystidioid, with a tendency to become irregularly swollen or moniliform, but usually subcylindrical, hyaline, thinwalled. (2) simple cylindrical paraphyses, thinwalled, 2·5–3·5 μ diam.

Hyphae: 3–5 μ diam., with rather rigid walls, colourless, encrusted with mineral matter.

Specimens examined: Universiteit van Stellenbosch, Herbarium P. A. van der Byl nr. 658, on *Podocarpus*, Stellenbosch.

This specimen was evidently determined by Burt, who cited it, loc. cit. It appears to fit *A. disciformis*. The author however, saw no submoniliform paraphyses 5–9 μ wide, which are seen in European material. This may have been due to the hurried circumstances under which the examination was made in the v. d. Byl Herbarium, for van der Byl mentions paraphyses of that sort in his description.

Aleurodiscus mirabilis (Berk. & Curt.) Höhnel in K. Akad. Wiss. Wien Sitzungsb. 118 (1909) 818.

Psilopeziza mirabilis Berk. & Curt. in Journ. Linn. Soc. Bot. 10 (1868) 364.

Aleurodiscus apiculatus Burt in Ann. Mo. Gard. 5 (1918) 186, f. 4. An extensive synonymy is given by Rogers & Jackson in Farlowia 1 (1943) 267.

FIG. 3.

Fructifications resupinate, effused with a narrow reflexed margin, membranous to coriaceous, pinkish when fresh, drying light yellow-brown or buff; hymenium even, not cracking, minutely pruinose under a lens; margin reflexed and rolling slightly inwards, villose or byssoid, pale coloured, almost white; thickness in section 350–600 μ. Basidia: clavate, up to 120–170 $\times$ 26–33 μ, with four stout conical sterigmata up to 25 $\times$ 6 μ; some basidia have a bulbous base decorated at the constriction with hyaline, unbranched, blunt spines up to 4 μ long.

Spores: hyaline, biapiculate, semilunate, up to 22·8 $\times$ 13·7 μ, with one side depressed, smooth (becoming minutely echinate, and 20–25 $\times$ 12–15 μ, fide Burt, loc. cit.).

Paraphysoids: (1) very numerous acanthophyses, some representing aborted basidia, others modified hyphae; clavate, hyaline, stoutwalled, with a long attenuated base, of the same dimensions as the basidia, decorated towards the base of the clavate part with hyaline spines. (2) hyphoid, hyaline, thickwalled, 53–66 μ long, decorated with hyaline aculeate spines, closely or sparsely arranged, the terminal branches of some subhymenial hyphae. (3) simple, unbranches paraphysoids, hyaline, somewhat flexuous, subcylindrical, about 130 $\times$ 8–9 μ, some quite smooth, others tending towards acanthophyses with a few basal spines.

Hyphae: hyaline, thickwalled, 4–5·3 μ wide, with occasional clamp connections, septate, branched, not encrusted.

Tissues: basal tissues composed of loosely intertexed hyphae which give the byssoid, white appearance to the margin; other tissues compactly arranged.

Specimens examined: 36768, *Talbot* (54), on *Hypericum*, Qudeni.

As remarked by Rogers & Jackson (loc. cit.), the sublunate, biapiculate spores and the abundant thickwalled long-appendiculate acanthophyses are the chief diagnostic features of this remarkable species. In the present specimen there are minor variations from Burt's description, e.g. the presence of clamp connections and the fact that no echinulate spores were seen. I have no doubts, however, in referring it to *A. mirabilis*. When fresh, the rosy pink colour of the fungus, effused widely over the substratum, was most conspicuous.

Aleurodiscus polygonioides (Karst.) Pilát in Ann. Mycol. 24 (1926) 221.

Corticium polygonioides Karsten, Symb. ad Myc. Fenn. 8 (1881) 12; Bourdot & Galzin in Bull. Soc. Myc. de Fr. 27 (1911) 232, Hym. de. Fr. (1928) 227, f. 69.

Fig. 5.

Fructifications at first orbicular, resupinate, later confluent and widely effused, remaining resupinate, membranous. Hymenium smooth, pruinose, eventually somewhat cracked, purplish, violet or lilac coloured when fresh, becoming duller later or changing to brownish or clay coloured. Margin whitish, pruinose when young, later concolorous with the hymenium. Thickness in section 195–325 μ.

Basidia: about 50–70 $\times$ 7–11 μ but immature; ovoid to pyriform and clustered when young, developing to irregularly clavate or subcylindrical.

Spores: (4·8)–6·4–8–(9·6) $\times$ (8·8)–10·4–14·4 μ, ovate or broad elliptical, with a distinct apiculus, hyaline, smooth, not amyloid.

Paraphyses: Dendrophyses present in profusion, hyaline to faintly coloured, bearing faintly coloured granules, arising from the tramal hyphae, their main axis 2–4 μ wide. Hyphae: hyaline, branched, septate, 2·5–4·8 μ wide, with clamp connections, the walls thin or a little thickened, lying more or less horizontally in the basal tissues, giving rise to erect dendrophyses.

Specimens examined: 40226, *H. King*, on *Lonicera*, Pretoria; 36903, 39072, *Talbot*, Hennops River; 36904, *Talbot*, on *Buddelja salvifolia*, Hennops River; 17817, *F. Eyles* (2102), on *Combretum*, Salisbury, S.R. (as *Stereum purpureum*).

This species has much the same structure as *Aleurodiscus roseus* but is readily distinguished by its colour. It is clear from Bourdot & Galzin's (1928, p. 336) notes that *Aleurodiscus ionides* is remarkably similar to *A. polygonioides*. I have disposed the present specimens under the latter name solely on the strength of Bourdot & Galzin's comment that *A. ionides* differs from *A. polygonioides* in having a ceraceous texture, not membranous, later becoming hardened and subcrustaceous and adhering strongly to the substratum.

Aleurodiscus roseus (Pers. ex Fr.) Höhnel & Litsch. in K. Akad. Wiss. Wien Sitzungsb. 115 (1906) 1568; Pilát in Ann. Mycol. 24 (1926) 219; Rogers & Jackson in Farlowia 1 (1943) 299.

Corticium roseum (Pers. ex Fr.) Fr., Epicrisis Syst. Myc. (1838) 560; Burt in Ann. Mo. Bot. Gard. 13 (1926) 224; Bourdot & Galzin, Hym. de Fr. (1928) 227.

Thelephora rosea Pers. ex Fr., Syst. Myc. 1 (1821) 451.

A fuller synonymy is given by Pilát, Rogers & Jackson, and Burt.

Fig. 6.

Fructifications at first orbicular with a slightly raised margin, later confluent, effused, resupinate with an appressed or raised margin. Hymenium light rose-coloured, paling later, smooth, pruinose. Margin white, shortly fibrillose. Texture membranous to pellicular. Thickness in section 200–220 μ.

Basidia: discontinuous, remaining immature for a long time, 30–55 $\times$ 5–7 μ (immature), exceeded by the paraphyses, ovate to pyriform when young, becoming cylindrical to clavate.

Spores: smooth, hyaline, ovate to broad elliptical, apiculate, 6·4–8·8 $\times$ 8–10·4 μ. Paraphyses: Dendrophyses abundant, their main axis about 2·4 μ wide, richly branched, arising from the lower hyphae, encrusted with minerals.

Hyphae: about 2·4 μ wide, hyaline, branched, septate, not encrusted, with clamp connections, the walls thin or a little thickened.

Specimens examined: All on *Acacia mollissima*: 39055, 39056, *Talbot*, Atholl Expt. Stn.; 39054, *Simpson & Talbot* (31), Qudeni.

A. roseus falls in the same group as *A. polygonioides* but the two are readily distinguished by their colour. The spore measurements given above, while falling in the range for this species in Europe (8–16·5 × 6–10 μ, fide Bourdot & Galzin), are rather small.

CYPHELLA Fries.

Donk (in Bull. Bot. Gard. Buitenzorg ser. iii, 17, 1941, pp. 159–160; ibid. ser. iii, 18, 1949, pp. 88–89 and 159) proposed the conservation of *Aleurodiscus* Rabenh. ex J. Schroet. against *Cyphella* Fr. The proposal was supported by Rogers (in Farlowia 3, 1949, p. 433) and was adopted by the Stockholm Congress. Thus the use in this paper of the name *Cyphella* is nomenclaturally improper, and an explanation is required.

The series of studies of which this paper forms a part, are intended to check the validity of the recorded species of South African Thelephoraceae, and to indicate synonyms and incorrect specific determinations where possible. Such work is essential before the many species that await collection may be identified and described. With few exceptions the type of revisionary work making a fundamental contribution to the broader aspects of classification and nomenclature can only be expected from the older countries with their better herbarium and library facilities. The dilemma in which the writer is now placed is whether to withhold publication of the facts uncovered about the South African species of *Cyphella*, or whether to act against the decision of Congress by retaining this invalid name in publication. It appears that as a temporary measure, until someone more favourably situated has monographed the genus and placed the species in generic segregates likely to have some stability, the interests of progress in mycology are better served by adopting the latter course.

Cyphella alboviolascens (Alb. & Schw. ex Fr.) Karsten in Finska Vet.-Soc. Bidrag Natur och Folk 37 (1882) 133; Saccardo Syll. Fung. 6 (1888) 669; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 12; Doidge loc. cit. p. 483.

Peziza alboviolascens Alb. & Schw. ex Fr., Syst. Myc. 2 (1823) 96; Alb. & Schw., Consp. Fung. (1805) 322, Pl. 8. f. 4.

Cyphella curreyi Berk. & Br. (!) in Ann. Mag. Nat. Hist. iii, 7 (1861) 379; Kalchbrenner in Grevillea 10 (1882) 104.

Fig. 7.

Fructifications sessile, lacking a subiculum, globose, later cupulate, 1–3 mm. diam., white, covered with abundant long, villose or strigose hairs arising from the base and sides of the cupule. Margin involute, closing the fructification when dry. Hymenium smooth, pale coloured, very light tawny (in European specimens also pale violet, grey-lilac, glaucous or greenish).

Basidia: clavate, 40–60 × 8–10 μ, occasionally with a basal clamp.
Spores: broad ovate to pip-shaped, often with a prominent apiculus, inequilateral, 11·2–14·4 × 9–9·6–(11·6) μ.

Hyphae: more or less horizontally arranged at the base of the cupule, hyaline, smooth, with occasional clamps, 1·5–3 μ diam., compact and entangled beneath the hymenium. Surface hairs: up to 200 × 5–7 μ, very thick-walled, with a narrow lumen, rounded at the apex, with finely roughened walls becoming smooth towards the base, and often encrusted with mineral granules.

Specimens examined: Universiteit van Stellenbosch, Herbarium P. A. van der Byl nr. 2503, *E. D. Loseby*, on *Vitis*, Stellenbosch.

This collection corresponds very well with European material of *Cyphella alboviolascens*. Another specimen filed as this species in the van der Byl Herbarium No. 2524, proved on examination to be *Cytidia flocculenta*. The material on which Kalchbrenner based his record of *Cyphella curreyi* has not been traced; *C. curreyi* B. & Br. (!) is a synonym of *Cyphella alboviolascens*.

Cyphella applanata sp. nov.

Fig. 12.

Fructifications 0·5–2 mm. diam., sessile, resupinate with upturned margin forming a flat, saucer-like body of membranous texture. Margin lobed, white, villose, the hairs covered with a white mineral incrustation. Hymenium smooth, dirty white to lightly greyed fawn.

Basidia: clavate, with 4 sterigmata, 17–25 × 4·5–5·5 μ.

Spores: hyaline, smooth, cylindrical to cylindric-curved with a depressed side, often cohering in groups of four, 3·2–4·8 × (6·4)–8–11·2 μ.

Hyphae: very fine, hyaline, with occasional clamps.

Hairs: thinwalled, pale yellowish, without clamps, heavily encrusted with acicular crystals, 2·4 μ wide without the crystal layer, forming a thick white, villose covering to the upturned margin.

Specimens examined: Type, 33350, *E. M. Laughton*, Eshowe, Zululand, Nov. 1941.

In its flat, discoid fructification with upturned, lobate margin, this species is not unlike *C. bloxami* and *C. disciformis* as described by Pilát (in Ann. Mycol. 22, 1924, 212) but differs in the shape and size of its spores and in having incrusted hairs. *Cyphella applanata* sp. nov.

Carposomata disciforma, applanata, 0·5–2 mm. diam., tenuissime membranaceo; margo lobata, extus pilis densis, simplicibus, 2·4 μ crassis, crystallis densissime incrustatis. Hymenium leve, sordide albidum vel griseo-fulvum. Basidia clavata, hyalina, 17–25 × 4·5–5·5 μ, sterigmatibus 4. Sporae hyalinae, leves, cylindraceae vel saepe subcurvulae et uno latere compressae. Hyphae hyalinae, tenuissimae, saepe nodosae. Pili tenue tunicati, haud nodosi, 2·4 μ crassi, crystallis granulosissimis dense villosi, substraminei. Typus, 33350, leg. *E. M. Laughton*, Eshowe.

Cyphella cheesmani Massee apud Cheesman in Journ. Linn. Soc. Bot. 38 (1909) 411; Saccardo Syll. Fung. 21 (1912) 422; Doidge, loc. cit. p. 483.

The writer has not traced any specimen of this species, but as it appears well characterised by its spores it is accepted and keyed out with the other species of *Cyphella*. A translation of Saccardo's description follows.

Membranous, sessile, cupular then flattened, with villose exterior, white, 1 mm. diam.; hymenium lightly plicate; basidia clavate with four sterigmata; spores ovoid, finely asperulate, hyaline, 12–15 × 7–8 μ.

Cyphella curreyi Berk & Br. (!) in Ann. Mag. Nat. Hist. iii, 7 (1861) 379; Kalchbrenner in Grevillea 10 (1882) 104.

Recorded by Kalchbrenner for an unnumbered collection of MacOwan from Somerset East. This collection has not been traced. *C. curreyi* is a synonym of *Cyphella alboviolascens* (Alb. & Schw. ex Fr.) Karst.

Cyphella farinacea Kalchbr. & Cooke (!) in Grevillea 9 (1880) 18; Kalchbrenner in Grevillea 10 (1882) 104; Saccardo Syll. Fung. 6 (1888) 671; Doidge loc. cit. p. 483.

Fig. 8.

Cupules gregarious, often touching one another, very shortly stalked or sessile, 0·3–1·5 mm. diam. when dry, discoid, becoming flattened, with inrolled margin when dry. Exterior covered with greyish-white meal composed not of hyphae but of mineral matter. Hymenium olivaceous or usually cinereous to blackish. General appearance is greyish with a dark interior.

Basidia: clavate, with 4 sterigmata, 6·5 × 19–20 μ, with basal clamps.

Spores: hyaline to faint yellow, smooth or appearing very minutely punctate, ovate or almost globose, 4·8–6·4 μ diam.

Hyphae: hyaline, septate, branched, with frequent large clamps which are often looped, subgelatinous, much entangled, 1·5–1·8 μ diam.

Specimens examined: Type, MacOwan (1221) in Herb. Kew and in Pretoria sub No. 20807.

Cyphella friesii Quélet, Champ. du Jura et des Vosges iii (1875) 15; Kalchbrenner in Grev. 10 (1882) 104.

This species was recorded by Kalchbrenner for an unnumbered collection of MacOwan from Somerset East. Doidge (loc. cit. p. 483) takes up this record under *Cyphella friesii* Crouan (described by Crouan in Florule du Finistere, 1867, 62).

The author is indebted to Dr. R. W. G. Dennis for drawing attention to yet another *Cyphella friesii*, described by Weinmann (in Hymeno-et GasteroMycetes hucusque in imperio Rossico observatos, 1836, 523) and antedating both Crouan's and Quélet's species, neither of which thus have any nomenclatorial standing. The different spelling of the epithet " Frisei " in Weinmann's description is clearly a misprint since it appears in Weinmann's own index as " Friesii Weinmann " and is obviously proposed in honour of Fries.

The material of Kalchbrenner's record has been examined (see Fig. 20), but is in too poor a condition to describe under a new name or to identify with a species already named. A brief description of this material follows:—

Cupules membranous, shortly stipitate or cuneate tapering to a sessile, reduced base; about 3–3·5 × 1·5–2 mm. in size; light dirty yellowish-brown, with a surface composed of cohering and flattened matted fibrils. Hymenium light yellowish-brown. Margin indistinctly incised-lobate. No basidia were seen. Abundant spores were present but it is doubtful whether they belong; they were globose, lightly coloured, minutely echinate, 3·5–4 μ diam. The context hyphae were indistinct, but hyaline and about 1·5 μ diam. The surface hyphae were hyaline, thickwalled with a narrow lumen, branched, 4–6·5 μ diam.

Cyphella fulvodisca Cooke & Massee (!) in Grev. 18 (1890) 50; Scott Elliot in Hedwigia 29 (1890) 66, Tab. 1; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 11; Saccardo Syll. Fung. 9 (1891) 247; Doidge loc. cit. p. 483.

FIG. 11.

= **Cyphella variolosa** Kalchbr. (!).

Cyphella pelargonii Kalchbr. (!) apud von Thuemen in Flora 68 (1875) 378; Saccardo Syll. Fung. 6 (1888) 677; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 11; Doidge loc. cit. p. 483.

FIG. 13.

Cupules closely gregarious in groups of 6–20, somewhat coherent with one another, rather horny when dry, light beige colour but appearing whitish owing to the presence of white pruinose hairs on the outside, about 1 mm. long and 0·5–0·8 mm. wide, more or less cylindrical with a tapered base. Hymenium yellow-brown.
Basidia: clavate, 25–35 × 6–8 μ.

Spores: light yellow-brown, smooth, with a small apiculus, elliptical to broad ovate, 5·5–6·8 × 8·3–10 μ.

Hyphae: colourless, thickwalled, with only a narrow lumen staining, somewhat gelatinised, with clamp connections, 3–4·8–(6·4) μ wide.

Surface hairs: yellow-brown with a lighter, rounded apex, appearing white macroscopically owing to the presence of mineral incrustation, (25)–40–60 × (3·5)–4–6 μ, occasionally with a basal clamp connection.

Specimens examined: Type, *MacOwan*, Cap. b. sp., Herb. Kalchbr., in Herb. Kew. See also the discussion under *Cyphella variolosa*.

Cyphella punctiformis (Fr.) Karst., Fung. Fenn. Exsicc. N. 714; Saccardo Syll. Fung. 6 (1888) 678; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 12; Doidge loc. cit. p. 483.

Peziza punctiformis Fr., Syst. Myc. 2 (1823) 105.

The above-cited records of this species for South Africa would appear to rest on the MacOwan collection from Somerset East (see next entry) which Kalchbrenner & Cooke determined as *C. punctiformis* var. *strigosa*, except for Doidge's citation of No. 28673 (*Rump* 311). This latter collection was wrongly determined, being in fact a very minute agaric, with most distinct lamellae and cheilo- and pleurocystidia. On present knowledge this species is not considered to be represented in South Africa.

Cyphella punctiformis (Fr.) Karst. var. *strigosa* Kalchbr. & Cooke in Grevillea 9 (1880) 18; Kalchbrenner in Grevillea 10 (1882) 104.

Peziza punctiformis Fr. *pr. parte*, fide Kalchbrenner loc. cit.

The habitat on rotten leaves is suggestive of *Cyphella punctiformis*, but apparently no specimen is in existence. The " description " given by Kalchbrenner & Cooke consists of three words, " Pilis elongatis, granulatis ", which hardly may be taken to validate a new variety, especially as it applies equally well to the main species. While not accepting the species or variety on present knowledge as being represented in South Africa, I have thought it worth while to give a description of *C. punctiformis*, translated from Bourdot & Galzin (Hym. de Fr., 1928, p. 160):—

Sessile, very small, 0·15–0·5 mm., thin, cupuliform with an inrolled margin and globose in dry times, pure white, villose or bristling; hymenium smooth, white. Hyphae generally indistinct, 1–4 μ diam.; hairs of the cuple 40–100 × 3–4 μ, thickwalled, pointed, rarely septate, asperulate in the upper parts; basidia 15–26 × 5–8 μ, with 2–4 sterigmata up to 2–3 μ long. Spores oblong or amygdaliform, rather variable, 5–10 × 3–4 μ.

Cyphella tabacina Cooke & Phil. (!) apud Cooke in Grev. 10 (1882) 123; Saccardo Syll. Fung. 6 (1888) 672; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 12; Doidge loc. cit. p. 484.

FIG. 10.

= **Cyphella variolosa** Kalchbr. (!). See next entry.

Cyphella variolosa Kalchbr. (!) in Grevillea 10 (1882) 104; Saccardo Syll. Fung. 6 (1888) 671; Doidge loc. cit. p. 484.

Cyphella tabacina Cooke & Phil. (!) apud Cooke in Grev. 10 (1882) 123; Saccardo Syll. Fung. 6 (1888) 472; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 12; Doidge loc. cit. p. 484.

Cyphella fulvodisca Cooke & Massee (!) in Grev. 18 (1890) 50; Scott Elliot in Hedwigia 29 (1890) 66, Tab. 1; van der Byl in Ann. Univ. Stellenbosch 7 (1929) 11; Saccardo Syll. Fung. 9 (1891) 247; Doidge loc. cit. p. 483.

Fig. 9.

Fructifications cupular, urceolate to hemispherical, subsessile or shortly stipitate, up to 2 mm. diam. when moist, 0·3–0·7 mm. diam. when dry; the margin entire, rolled inwards irregularly when dry. Cupules gregarious, seated upon a red-brown subiculum which may be thick, scanty or absent, exterior white or greyish, mealy, composed of mineral matter and very short hairs. Hymenium drying tawny to olivaceous.

Basidia: cylindric-clavate, with 4 sterigmata, 4·2–8 × 23–40 μ, with basal clamps.

Spores: abundant, coloured, pale yellow-brown, broad elliptic, ovate or broad fusoid, with one to several guttules and a minute apiculus, 4·8–6·4 × 7·3–9·6 μ.

Hyphae: hyaline, 1·6–2·4 μ diam., septate, with clamps, branched, thinwalled.

Hairs of cupule: pale yellow-brown, thin- to thickwalled, the wall sometimes minutely roughened, more or less cylindrical to fusoid, sometimes with a basal clamp, 3·5–5–(7) × 35–58 μ.

Subiculum: absent, scanty or well developed, reddy-brown to chocolate coloured, shortly velutinate, composed of branched, interwoven, repent hyphae, pale coloured to yellow-brown, thickwalled with occasional clamps, 2·4–6·4 μ wide, terminating in more or less erect hairlike hyphae 3–5–6·4 μ wide and 64–120 μ long.

Specimens examined: As *C. variolosa*: Type, *MacOwan* (1381) ex Herb. Kalchbr. in Herb. Kew and sub No. 20939 in Pretoria; 40924, *Talbot*, on *Populus deltoides*, Piet Retief, Tvl.; As *C. tabacina*: Type, 11146, *J. M. Wood* (524) and in Herb. Kew.; As *C. fulvodisca*: Type, *Scott Elliot*, Fort Dauphin, Madagascar, in Herb. Kew; *Farquharson* (53), S. Nigeria, in Herb. Kew; *Dummer* (4158) and (1157), Uganda, in Herb. Kew; 35563, *Rump* (753), Newsel Beach, Natal; 12017, *Dummer* (1157), Uganda.

A close comparison of the types of *C. variolosa*, *C. tabacina* and *C. fulvodisca* leads me to believe that they are all the same species. The absence of a subiculum in the type of *C. variolosa* is not regarded as an important distinction; for in *C. tabacina*, the species in which the subiculum is best developed, there are parts almost devoid of it, while in *C. fulvodisca* the subiculum is thin and scanty and sometimes hardly distinguishable. The size of the cupules in all three species is variable, as also are their stipes. *C. fulvodisca* tends to be sessile, but cupules showing a short stipe are present. In *C. tabacina* the stipes are short while in *C. variolosa* they are comparatively long. The only specimens of *C. tabacina* and *C. variolosa* are their types. The author believes that they are merely developmental stages in a species which is most widely represented by the stage which received the name *C. fulvodisca*. In microscopic characters all three species are a close match, as is shown in Table 1.

Table 1.

Species.	Basidia, Size in μ.	Spores, Size in μ.	Hairs, Size in μ.
C. variolosa.....	6·6–7·2 × 23–26	4·8–6·4 × 8–9·6	35–58 × 4·5–6
C. tabacina.....	6–8 × 25–40	4·8–6·4 × 7·2–9·6	38–56 × 4–7
C. fulvodisca.....	4·2–5 × 26	4·8–6 × 6·4–8·8	44–52 × 3·5–4·8

In microscopic characters *C. pelargonii* and *C. variolosa* are very close, and it is possible that they are synonymous, in which case the former name would have priority. With only one specimen for examination it is difficult to assess how far the greater cupular size of *C. pelargonii* may be reconciled with the known variation in this feature in *C. variolosa*. I have differentiated the two here on account of the greater size of the cupules in *C. pelargonii* and because its hyphae are thickwalled and commonly wider than those of *C. variolosa*.

Cyphella Species Insufficiently Known.

(1) The species recorded by Kalchbrenner as *Cyphella friesii* Quél. See p. 473, and Fig. 20.

(2) The species represented by the type of *Femsjonia natalensis* Cooke (in Grevillea 10, 1882, 123). This is cited by Saccardo Syll. Fung. 6 (1888) 780, and by Doidge loc. cit. p. 477. See Fig. 19.

The type, No. 11047 (*J. M. Wood*, 476) has been examined and is certainly not one of the Dacryomycetaceae. It seems referable to *Cyphella*, but owing to lack of spores (also mentioned by Cooke) and difficulty in interpreting some other structures it is not considered sufficiently well characterised to be included in the known species of *Cyphella*.

The cupules are yellowish drying light orange-yellow, 0·3–0·6 mm. diam. when dry (0·5–1 mm. fide Cooke), somewhat fleshy-gelatinous in texture, sessile, discrete but occurring on a floccose to pruinose greyish-white subiculum. The cupules are wide open, their exterior being glabrous or covered with a fine scanty meal. In the hymenium are clavate organs 25–35 × 6·4–8·5 μ of the appearance of basidia, also clavate organs 13–18 × 3·5–5·5 μ again like basidia. No sterigmata or spores were seen. Also in the hymenium were ovate vesicular bodies, 10–15 × 15–23 μ, whose nature and origin could not be made out. The hyphae were hyaline, subgelatinous, with clamps, thinwalled, 1·8–3 μ wide. The subiculum was composed of scanty hyaline hyphae, thinwalled, 2·8–3·2 μ diam., surrounded by heavy deposits of minerals.

CYTIDIA Quélet.

Cytidia cornea Lloyd (!) in Lloyd Myc. Notes 5 (1917) 656, figs. 935–937; Doidge loc. cit. p. 484.

The author has examined the type of this species (*Duthie* 154, in Lloyd Mycological Collections No. 34063) and concludes with Martin (in Lloydia 5, 1942, 161) and W. B. Cooke (in Mycologia 43, 1951, 208) that it must be referred to **Cytidia habgallae** (Berk. & Br.) Martin.

Cytidia flocculenta (Fr.) Höhnel & Litsch. in K. Akad. Wiss. Wien Sitzungsb. 116 (1907) 758; Burt in Ann. Mo. Bot. Gard. 11 (1924) 9, Pl. 1, f. 7; W. B. Cooke in Mycologia 43 (1951) 204; Doidge loc. cit. p. 484.

Thelephora flocculenta Fries, Elenchus Fung. 1 (1828) 184.
Corticium flocculentum Fries, Epicrisis (1838) 559, Hym. Eur. (1874) 647.
Cyphella ampla Lév. in Ann. Sci. Nat. ser. iii, 9 (1848) 126.
Further synonyms are given by W. B. Cooke, loc. cit.

Fig. 16.

Fructifications discoid to shallow cupular, membranous-gelatinous in texture, up to 1·5 cm. diam., sessile, attached more or less centrally; surface greyish-white, hairy, with a floccose tomentum composed of hyaline hyphae united into fascicles, without much mineral matter. Hymenium smooth, but usually with a few prominent veins, coloured fawn to reddish brown, darkening on drying to a dull reddy-black. Thickness in section excluding tomentum about 700 μ.
Basidia: 30–(40) × 4–5 μ, cylindrical to clavate.
Spores: hyaline, smooth, cylindrical to allantoid, 1·5–3 × 7–10 μ.

Hyphae: gelatinised, thickwalled, usually only the lumen showing clearly, with numerous clamp connections, much branched and anastomosed, 1–3 μ diam.

Tissue differentiation: a dark compact zone subtends the surface hairs.

Hairs: thickwalled, unbranched, without septa or clamps, hyaline, sometimes a faint straw colour, 4–5 μ diam.

Specimens examined: Universiteit van Stellenbosch, Herbarium P. A. van der Byl nr. 2524 (as *Cyphella alboviolascens*); 39103, *van Hoepen*, on *Populus*; 28804, *Doidge & Bottomley*, on *Populus*; 27569, *Louwrens*; 32505, *Jacot-Guillarmod*; 24852, on *Quercus*; 23719, *Reinecke*; 40474, *Talbot*.

Cytidia habgallae (Berk. & Br.) Martin in Lloydia 5 (1942) 161, figs. 4–12; W. B. Cooke in Mycologia 43 (1951) 208; Doidge loc. cit. p. 484.

Corticium habgallae Berk. & Br. in Journ. Linn. Soc. Bot. 14 (1873) 72.

Cytidia cornea Lloyd (!) in Lloyd Myc. Notes 4 (1917) 656, figs. 935–937.

Aleurodiscus corneus (Lloyd) Lloyd (!) in Lloyd Myc. Notes 6 (1920) 930, f. 1688.

Aleurodiscus capensis Lloyd (!) in Lloyd Myc. Notes 6 (1920) 930, f. 1687, ibid. 6 (1921) 1088; Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 43.

Gloeosoma capensis Lloyd (!) (as McGinty) *nomen provisiorum* in Lloyd Myc.No tes 6 (1921) 1088; Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 42.

Aleurocystus capensis Lloyd (!) (as McGinty) ex Stevenson & Cash in Bull. Lloyd Library No. 35 (1936) 42; Lloyd (as McGinty) in Lloyd Myc. Notes 6 (1921) 1088, *nomen provisiorum*.

An extended synonymy is given by Martin (loc. cit.) and by W. B. Cooke (loc. cit.).

Fig. 17.

Fructifications sessile, attached by the central part to the substratum, discoid, irregularly circular with lobed, slightly upturned margin, single or confluent, coloured whitish to pale creamy or with a pinkish-buff tint when old (may become darker still, fide Martin). Texture fleshy-gelatinous when moist, drying ceraceous-horny. Diameter when dry 2–6 mm. Thickness in section up to 1000 μ.
Basidia: large, clavate, 10–17 × 70–95 μ (immature) with 2–4 sterigmata up to 10 μ long and 4 μ wide at the base.

Spores: at first hyaline, thinwalled, smooth, with a prominent apiculus, ovate or broad elliptic, 15–19 × 13–14 μ (up to 18–25 × 10·8–18 μ, fide W. B. Cooke); finally the walls become thickened to as much as 2·5 μ thick and are penetrated by small peglike projections of the lumen in two (rarely more) places, one opposite the apiculus and one at the opposite pole of the spore; the thickened spores are commonly found embedded in the tissues of the fructification.

Paraphyses: accompanying the basidia, hyaline simple paraphysoids or dendrophyses with short branches, thinwalled, not encrusted, 1·5–3 μ wide and 40–60 μ long.

Cystidia: embedded or projecting above the hymenium, usually fusoid, with thin to thick walls covered with detersile pale yellowish-brown mineral granules, (8)–16–25 × 60–100 μ.

Hyphae: smooth, hyaline, thinwalled, gelatinised, with clamp connections, 1–2 μ wide, arranged more densely towards the outer parts of the fructification.

Specimens examined: *A. V. Duthie* 154 (Lloyd Mycol. Collections No. 34063), type of *Cytidia cornea*; *P. A. van der Byl* 833 (Lloyd Myc. Coll. No. 34029), type of *Aleurodiscus capensis*; 23490, *F. Eyles* (675), Mazoe, S.R.

The cystidia and the presence of peculiarly thickened basidiospores characterise this species. According to Martin (l.c.) the imperfect state of this fungus is represented by *Matula poroniaeformis* (B. & Br.) Massee and *M. rompelii* (Rick) Lloyd.

Cytidia simulans Lloyd (!) in Lloyd Myc. Notes 6 (1920) 991, f. 1772; Doidge loc. cit. p. 484; W. B. Cooke in Mycologia 43 (1951) 207.

FIG. 18.

Fructifications discoid, centrally attached, sessile, 1–1·5 cm. diam., with a fleshy-gelatinous texture; hymenium smooth but bearing small wrinkles, pale brown; surface white, bearing a few hyaline hairs encrusted heavily with mineral granules and thus appearing pruinose.

Basidia: cylindric-clavate, 20–35 × 3–4·5 μ, with (fide W. B. Cooke) 2 or 4 sterigmata.

Spores: of two kinds (1) abundant, small, hyaline, smooth, cylindrical or allantoid, 2–2·5–(3·2) × 6·4–9·6–(11·2) μ, borne on the basidia with four sterigmata, (2) scanty, larger, hyaline, smooth, ovate to elliptic-depressed, 4·8–6·4 × 9·6–12·8 μ, borne on basidia with two sterigmata.

Hyphae: hyaline, more or less thickwalled with only the lumen showing clearly, gelatinised, with numerous clamp connections, much contorted and sometimes undulating, 1·5–3 μ diam., branched and anastomosed.

Specimens examined: Type, *A. V. Duthie* 243, in Lloyd Myc. Coll. No. 33589.

The larger spores are not easy to find in the type, and only, material of this species, while the smaller spores are much like those of *Cytidia flocculenta*. The latter may be distinguished by its long floccose hairs on the surface, where *C. simulans* has only a few short hairs and derives its white, pruinose appearance from the mineral granules encrusting its surface.

DENDROTHELE Höhnel & Litsch.

Dendrothele duthieae sp. nov.

FIG. 22.

Fructifications resupinate with a narrowly upturned margin, not firmly adnate, discoid, up to 5 mm. diam., or elongated-confluent, bearing on the hymenium white papillae (hyphal pegs) visible to the naked eye, emerging from a whitish to pale tan coloured hymenium; texture pellicular, the hymenium being membranous and the basal tissues very soft and byssoid.

Basidia: long, clavate, with a wavy outline, often with a basal clamp, 50–110 × 10–14 μ, with four sterigmata.

Spores: hyaline, smooth, pip-shaped or ovate-elliptical to long-elliptical with the attached end narrowed to a prominent apiculus and commonly curved, not amyloid, abundant, 8–9·6–(11·2) × (15)–17–19–(22) μ.

Hyphal pegs: abundant, visible to the naked eye, white, superficial, i.e. easily detached and leaving a crater when removed, composed of dendrophytic hyphae with short, irregular branches, heavily encrusted with minerals, often showing a clamp near the base of the main axis, 1·5–3·5 μ diam., with firm walls. Hyphal pegs sterile.

Paraphyses: in the hymenium are dendrophyses like those of the hyphal pegs, and aborted basidia, some with a tendency to fork and others with vague submoniliform constrictions.

Hyphae: basal hyphae loosely, horizontally interwoven, byssoid, hyaline, septate, branches, with numerous clamps and with thin, firm walls and a wide lumen, about 3·2 μ wide. The hymenium and subhymenial layers contain much mineral matter.

Specimens examined: Type, No. 31393, *A. V. Duthie* (187), without locality but probably Knysna area.

The spores of this species have a distinctive apiculus which remains uncoloured by phloxine stain and is easily picked out. It is possible that hyphal pegs are not always produced in this species, but on the basis of the present specimen it must be disposed in *Dendrothele* rather than *Aleurodiscus*.

Dendrothele duthieae sp. nov.

Fructificationes resupinati, discoidales, usque ad 5 mm. diam., elongato-confluentes. Margines minute revolutae. Hymenium albicans vel dilute alutaceum, minute albopapillosum. Textura pellicularis. Basidia clavata, 50–110 × 10–14 μ. Sporae hyalinae, laeves, amygdaliformes vel ovato-ellipticae, haud amyloidae, (15)–17–19–(22) × 8–9·6–(11·2) μ. Papillae steriles, oculo nudo conspicuae, superficiales, ex hyphis dendrophyticis et corporibus mineralibus compositae. Paraphysae (1) dendrophyticae (2) basidia abortiva, nonnula submoniliforme constricta. Hyphae basales laxe intertextae, hyalinae, septatae, nodoso-septatae, ramosae, tenue tunicatae. Typus: No. 31393, leg. *A. V. Duthie* (187).

GLOEOSOMA Bresadola.

Gloeosoma capensis Lloyd (as McGinty) (!) in Lloyd Myc. Notes 6 (1921) 1088, *nomen provisiorum*. Further referred to in: Stevenson & Cash in Bull. Lloyd Library No. 25 (1936) 42; Martin in Lloydia 5 (1942) 162.

At the same time suggesting a new genus, *Aleurocystus*, to accommodate *Aleurodiscus capensis*, Lloyd (loc. cit.) proposed that the latter might also be transferred to the genus *Gloeosoma*. The arguments given under *Aleurocystus*, apply here as well, and one concludes that *Gloeosoma capensis* is also a *nomen provisiorum* and was not validly published. See under **Cytidia habgallae** (B. & Br.) Martin.

POROTHELEUM (Fr. ex Fr.) Fr.

Porotheleum incanum (Kalchbr.) Saccardo, Syll. Fung. 6 (1888) 423.

Stigmatolemma incanum Kalchbr. in Grevillea 10 (1882) 104; Doidge loc. cit. p. 544 (as *Stigmatolemina incanum*).

Fig. 21.

Fructifications composed of sessile cup-shaped fruit-bodies very closely aggregated and confluent, at first closed, later opening and showing the hymenium lining the interior of each cupule. The cupules are all seated on a white subiculum which projects as a white, very narrow, byssoid margin beyond the aggregate fructification. Walls of cupules are grey, i.e. light cinereous in colour giving the whole a light grey appearance, and are shortly byssoid on the exterior. Hymenium very dark, almost black when dry. Occupying areas several cm. long and 1–2 cm. wide on bark and wood. Diameter of the cupules ± 325 μ.

Basidia: clavate, 16·6–25·6 × 7·2–9·6 μ, often with a large apical guttule. Sterigmata 2–4, conical, stout, 1·6 μ long. Basidia are formed in clusters and show occasional basal clamps.

Spores: hyaline, smooth, cylindrical with one side depressed, or occasionally seen as broad elliptical, 7·2–8 × 3·2–4·4 μ, abundant.

Hyphae: of the cupules and the subiculum are hyaline, very narrow, up to 1·6 μ diam., branched, with clamp connections, smooth in the cupules but often coated with very fine mineral matter in the subiculum.

Specimens examined: No. 31058 (*b*), *A. M. Bottomley*, dead wood, Knysna, 1939.

In the original description of *Stigmatolemma incanum* the spores are said to be 15 μ long. The author had been unable to trace authentic material of this species and was about to propose a new species for No. 31058 (*b*) based on the difference in spore size, when Dr. Wm. Bridge Cooke kindly informed him that there was apparently type material of *S. incanum*, ex Herb. Karsten, preserved in the Lloyd collections sub No. 17601 in the U.S. National Fungus Collections. Dr. Cooke states that this specimen, collected by MacOwan at Somerset East, has spores measuring 7 $\times$ 4 μ. It therefore corresponds very well with Miss Bottomley's new collection.

In using the generic name *Porotheleum*, I have not overlooked Donk's argument (in Reinwardtia 1, 1951, 217–218) that *Porotheleum* Fr. (later spelled *Porothelium* by Fries himself) is a later homonym of *Porothelium* Eschweiler, and so should be replaced by *Stromatoscypha* Donk (1951, loc. cit.). An alternative interpretation of the facts and Code of Nomenclature has been suggested to me by Dr. Cooke in a private communication. I feel that a full statement must await Dr. Cooke's own publication on this group and that meanwhile it would be inadvisable to make a new combination of *P. incanum* under *Stromatoscypha*.

SOLENIA Pers. ex Fr.

Solenia candida Persoon in Roemer Neues Mag. Bot. 1 (1794) 116, Syn. Fung. (1801) 676, Myc. Eur. 1 (1822) 334; Fries, Syst. Myc. 2 (1823) 200; Saccardo Syll. Fung. 6 (1888) 424; Doidge loc. cit. p. 487.

This record rests on the specimen cited by Doidge, 28297, *W. G. Rump* (223), in the National Herbarium, which is the type specimen of **Solenia natalensis** W. B. Cooke sp. nov.

Solenia minima Cooke & Phil. (!) apud Cooke in Grevillea 10 (1882) 123; Saccardo Syll. Fung. 9 (1891) 207; Doidge loc. cit. p. 487.

Fig. 15.

Cupules delicate, membranous, sessile, whitish to pale lemon yellow when dry, short-cylindrical to barrel-shaped, discrete but gregarious, small, 250 μ high, 130 μ diam.

Basidia: clavate, 16–19 $\times$ 4·8–6 μ.

Spores: hyaline, smooth, subglobose to broad ovate, 2·5–3 $\times$ 3–4 μ.

Hyphae: hyaline, rather indistinct, about 1·6 μ diam., no clamps seen.

Specimens examined: Type, *Wood* (482), on *Strelitzia*, Inanda, under Nos. 10706 and 11145 in National Herb., Pretoria, and specimen in Kew.

The species is distinguished by its very small, subcylindrical, sessile cupules, which are yellowish when dry, and lack surface hairs.

Solenia natalensis W. B. Cooke sp. nov.

Receptacles cylindric, 0·5 mm. tall at margins of colony, separate, in centre of fruiting area up to 1·0–1·5 mm. tall, sometimes up to 2 mm., becoming densely gregarious, apparently adnate in sheaths; subiculum evanescent or absent, not evident; surface hairs when present strongly appressed, up to 3 μ in diameter, with thick walls, the outer half in the shape of a medium to tight spiral, mostly toward the upper part of the receptacle; toward the lower part scattered, hyaline, thick-walled, branched hyphae occur; context hyphae 2·0–2·5 μ, up to 3·5 μ in diameter, simple septate and with clamp connections; hymenium formed of a tight palisade of basidia; basidia with basal clamps, mostly 12·5 $\times$ 5·5 μ, 4-sterigmate; spores hyaline, ovate, apiculate, smooth, somewhat flattened on one side, 3–4 $\times$ 2·5–3·5 μ.

Hab.: on indigenous wood.

Type: Town Bush, Pietermaritzburg, Natal, Union of South Africa, Coll. *W. G. Rump* (223), Oct. 1934 (Pretoria 28297).

This specimen was determined originally as *Solenia candida*. It can be distinguished from that species by its smaller, ovate spores and its surface hairs which are spiral in the outer half rather than dichophysoid. Its marginal cupules resemble superficially those of *S. candida* while those in the centre of a colony appear like those of the variety *polyporoidea*. On examination the adjacent cupules are not grown together, which would be the case if the cupules were truly adnate, and are not damaged when separated in mounting.

Solenia natalensis W. B. Cooke sp. nov.

Receptacula cylindracea, 0·5–2 mm. alta, separata deinde dense gregaria, adnata. Subiculum fugiens vel absens, non manifestum. Pili superficiei plerumque versu, partem superam receptaculi, forte appressi, usque ad 3 μ diam., crasse tunicatis dimidiis extremis in helicem glomeratis; hyphae hyalinae, crasse tunicatae, ramosae plerumque ex parte inferiore receptaculi orientes. Hyphae contextae 2·0–2·5 μ, usque ad 3·5 μ diam., vel septatae vel nodoso-septatae. Basidia 12·5 × 5·5 μ, infra nodulis, sterigmatibus 4. Sporae hyalinae, ovatae, apiculatae, leves, uno latere compressae, 3–4 × 2·5–3·5 μ. Typus No. 28297, leg. *W. G. Rump* (223).

Solenia rhoina W. B. Cooke sp. nov.

Receptacles densely crowded in definite areas, with a thin layer of arachnoid subicular hyphae on substratum where cups do not occur; receptacles up to 0·5 mm. in diameter, sessile, broad cupulate, cream-colour when dry; margin entire, silky, appearing like a minute *Stereum*; context very thin, the several layers of hyphae giving rise on the one hand to surface hairs, on the other to basidia; surface hairs hyaline, solid, parallel, appressed, progressively shorter to the margin, less appressed near the base, 25–75 × 2·5–4·0 μ; hymenium of tightly packed basidia each with a basal clamp, 4-sterigmate, 14·5–18 × 5–7 μ; spores smooth, hyaline, ovate, apiculate, flattened on one side, 6–7·5 × 4·5–5·5 μ.

Hab.: on *Rhus lancea* (Karreeboom).

Type: Hennops River, Pretoria District, Union of South Africa, collected by *P. H. B. Talbot*, Aug. 15, 1948. (Pretoria 39049).

This species is distinct from other species in the genus. The subiculum is *Solenia*-like rather than *Porotheleum*-like, but the colonies are as discrete as in some species in that genus.

Solenia rhoina W. B. Cooke sp. nov.

Receptacula usque ad 0·5 mm. diam., in locis definitis dense conferta, sessilia, cupulata, cremicolora. Subiculum tenue, arachnoideum. Margo integer, bombycinus. Contextus tenuissimus. Pili superficiei hyalini, solidi, appressi, paralleli, versus marginem breviores, 25–75 × 2·5–4·0 μ. Basidia infra nodulis, sterigmatibus 4, 14·5–18 × 5–7 μ. Sporae hyalinae, leves, ovatae, apiculatae, uno latere compressae, 6–7·5 × 4·5–5·5 μ. Typus No. 39049, in ramo arboris quae *Rhus lancea* appellatur, leg. *P. H. B. Talbot*.

STIGMATOLEMMA Kalchbrenner.

Stigmatolemma incanum Kalchbr. in Grevillea 10 (1882) 104; Doidge loc. cit. p. 544 (as *Stigmatolemina incanum*).

= **Porotheleum incanum** (Kalchbr.) Sacc.

Keys to Accepted Species.

Aleurodiscus.

1. Both yellowish gloeocystidia and encrusted dendrophyses present together. Amyloid granules encrusting the dendrophyses. Spores broad elliptic to ovate, 13·5–15 × 7·5–8 μ.
A. botryosus.
Either gloeocystidia or dendrophyses present, or both absent. Spores otherwise. 2.
2. Spores semilunate, biapiculate, smooth or minutely echinate, about 14 × 23 μ. Acanthophyses and simple unbranched paraphysoids present. *A. mirabilis.*
Spores otherwise. 3.
3. Fructifications whitish or light-coloured but not rosy, purplish, violet, lilac or brownish to clay-coloured. 4.
Fructifications rosy, purplish violet, lilac, brownish to clay-coloured. 6.
4. Spores ovate-subglobose, 18–22 × 12·5–16 μ. Simple cylindrical paraphysoids and gloeocystidioid submoniliform paraphysoids present. *A. disciformis.*
Spores not more than 8 μ broad. Encrusted dendrophyses and bulbous pseudophyses with a short to long apical outgrowth present. 5.
5. (Spores ovoid, 5·6–6·4 × 8–12 μ, ratio length/width less than 2·0. *A. acerinus.*)
Spores broad elliptic to ovate, 4–8 × 9–17·6 μ, ratio length/width more than 2·0.
A. acerinus var. *alliaceus.*
6. Fructifications rose coloured, paling to a fleshy tint on storage. *A. roseus.*
Fructifications purplish, violet, lilac or partly changing to brown or clay colour.
A. polygonioides.

Cyphella.

1. Fructifications cupulate, sessile or shortly stalked. 2.
Fructifications discoid with reflexed margin (i.e. saucer-shaped). Encrusted, villose hairs on reflexed part. Spores cylindrical, straight or curved, 3·2–4·8 × (6·4)–8–11 μ.
C. applanata.
2. Fructifications villose with long hairs on the exterior. 3.
Fructifications pruinose with short, sparse hairs or mineral encrustations, or nude. 4.
3. Spores smooth, broad ovate to pip-shaped, 11·2–14·4 × 9–9·6–(11·6) μ. Cupules 1–3 mm. diam.
C. alboviolascens.
Spores finely asperulate, ovoid, 12–15 × 7–8 μ. Cupules 1 mm. diam., then becoming flattened.
C. cheesmani.
4. Spores hyaline, ovate to subglobose, 4·8–6·4 μ diam., smooth or very minutely punctate. Cupules 0·3–1·5 mm. diam., not hairy, pruinose with mineral deposits. *C. farinacea.*
Spores lightly coloured, cupules with sparse, short hairs on exterior. 5.
5. Cupules up to 1000 μ high, lacking a subiculum. Hyphae thickwalled, 3–4·8–(6·4) μ wide.
C. pelargonii.
Cupules up to 600 μ high, commonly seated on a reddy-brown subiculum which may be scanty or absent. Hyphae thinwalled, 1·6–2·4 μ wide. *C. variolosa.*

Cytidia.

1. Spores large, ovate or broad elliptical, at first hyaline, later pale coloured with the wall thickening to 2·5 μ and penetrated by peglike projections of the lumen. Fusoid, encrusted cystidia present.
C. habgallae.
Spores otherwise. Cystidia absent. 2.
2. Spores of one kind only, cylindrical to allantoid, 1·5–3 × 7–10 μ. Cupular hairs long and floccose.
C. flocculenta.
Spores of two kinds (*a*) cylindrical or allantoid, 2–2·5–(3·2) × 6·4–9·6–(11·2) μ, (*b*) ovate to elliptic-depressed, 4·8–6·4 × 9·6–12·8 μ. Cupular hairs short and scanty.
C. simulans.

Solenia.

1. Cupules 170–250 μ diam., 1 mm. long; creamy when dry, with spiral surface hairs in the outer half. *S. natalensis.*
Cupules 130 μ diam., 250 μ long; yellowish when dry, lacking surface hairs.
S. minima.
Cupules up to 500 μ diam., creamy yellow, with solid parallel surface hairs.
S. rhoina.

Explanation of the Illustrations.

Throughout the illustrations the following symbols apply:—

A = Acanthophyses.	HA = Habit.
B = Basidia.	P = Pseudophyses.
C = Cystidia.	S = Spores.
D = Dendrophyses.	SE = Section.
G = Gloeocystidia.	SH = Surface hairs.
H = Hyphae.	

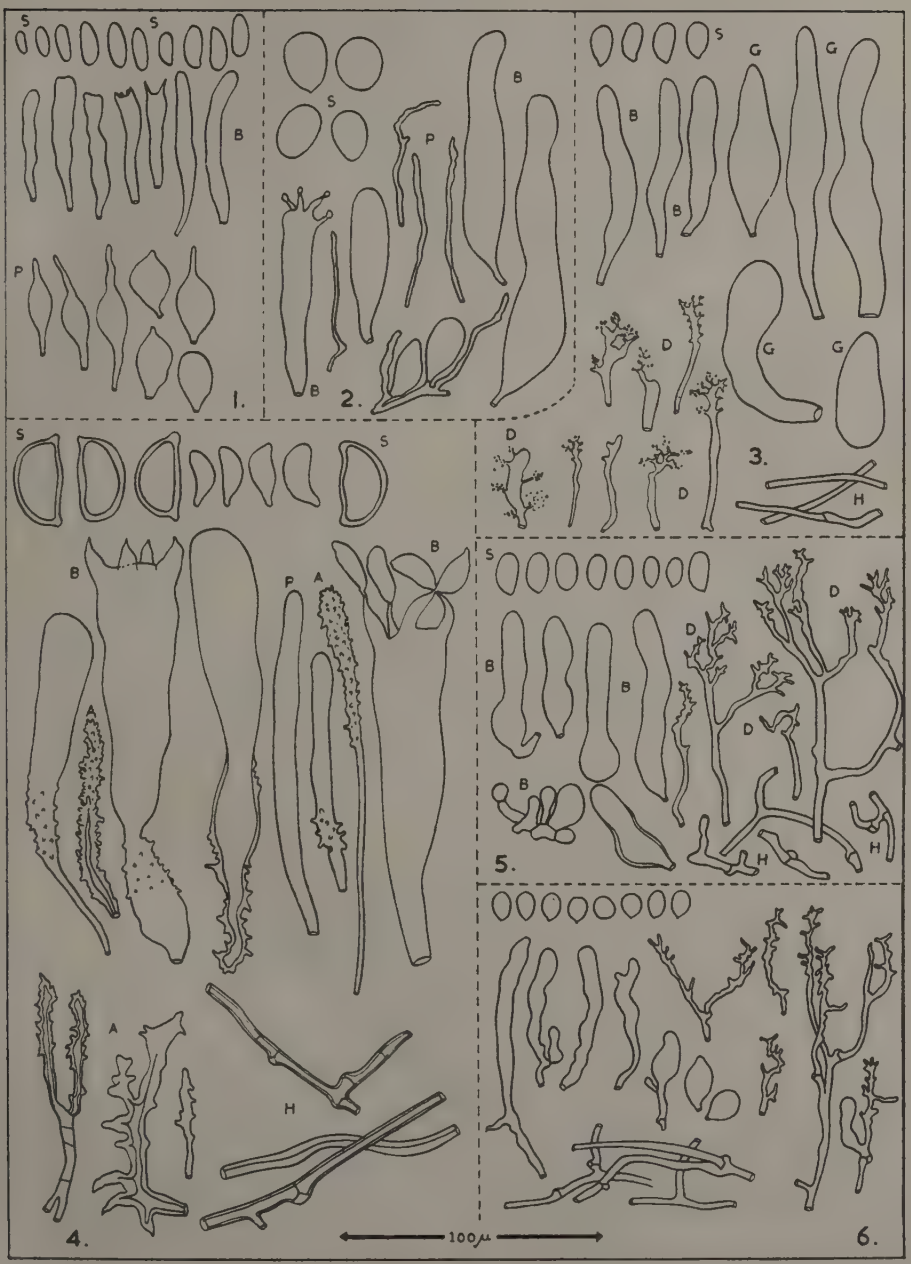

FIG. 1.—*Aleurodiscus acerinus* var *alliaceus* drawn from the type of *A. acerinus* var *longisporus*; FIG. 2.—*Aleurodiscus disciformis*; FIG. 3.—*Aleurodiscus botryosus*; FIG. 4.—*Aleurodiscus mirabilis*; FIG. 5.—*Aleurodiscus polygonioides*; FIG. 6.—*Aleurodiscus roseus.*

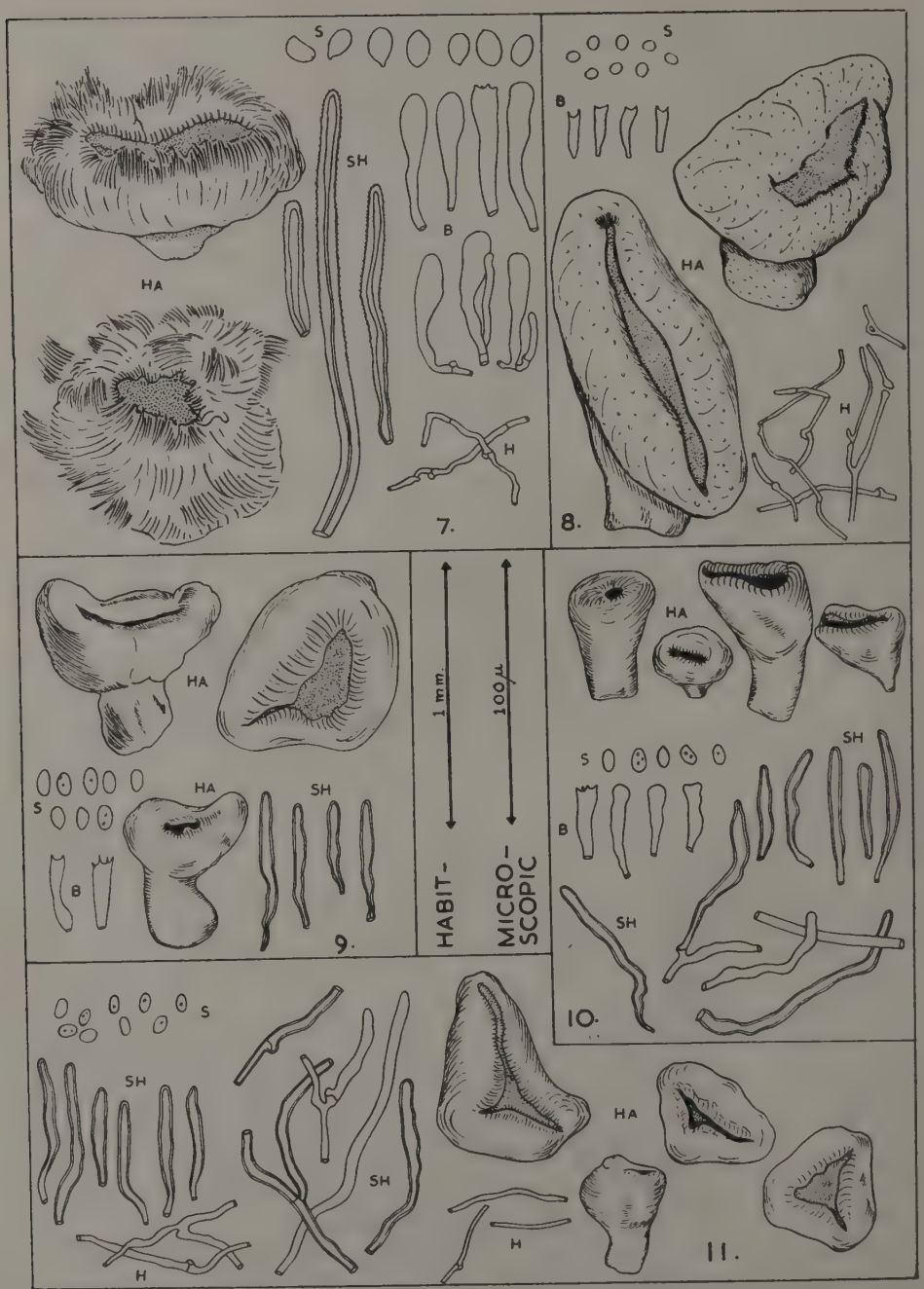

FIG. 7.—*Cyphella alboviolascens*; FIG. 8.—*Cyphella farinacea*, from the type; FIG. 9.—*Cyphella variolosa*, from the type; FIG. 10.—*Cyphella tabacina*, from the type; FIG. 11.—*Cyphella fulvodisca*.

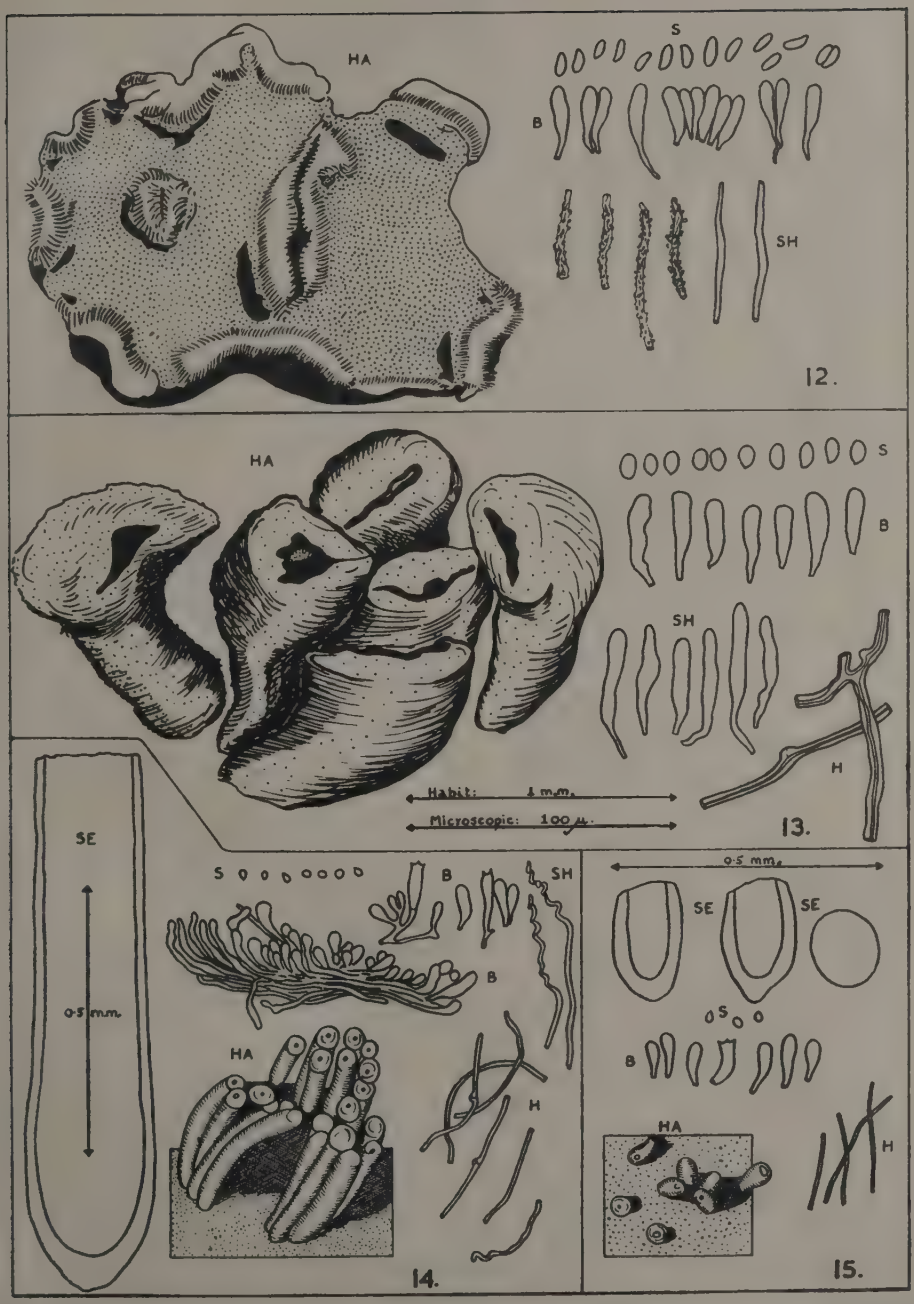

FIG. 12.—*Cyphella, applanata* from the type; FIG. 13.—*Cyphella pelargonii*, from the type; FIG. 14.—*Solenia natalensis*, from the type; FIG. 15.—*Solenia minima*, from the type.

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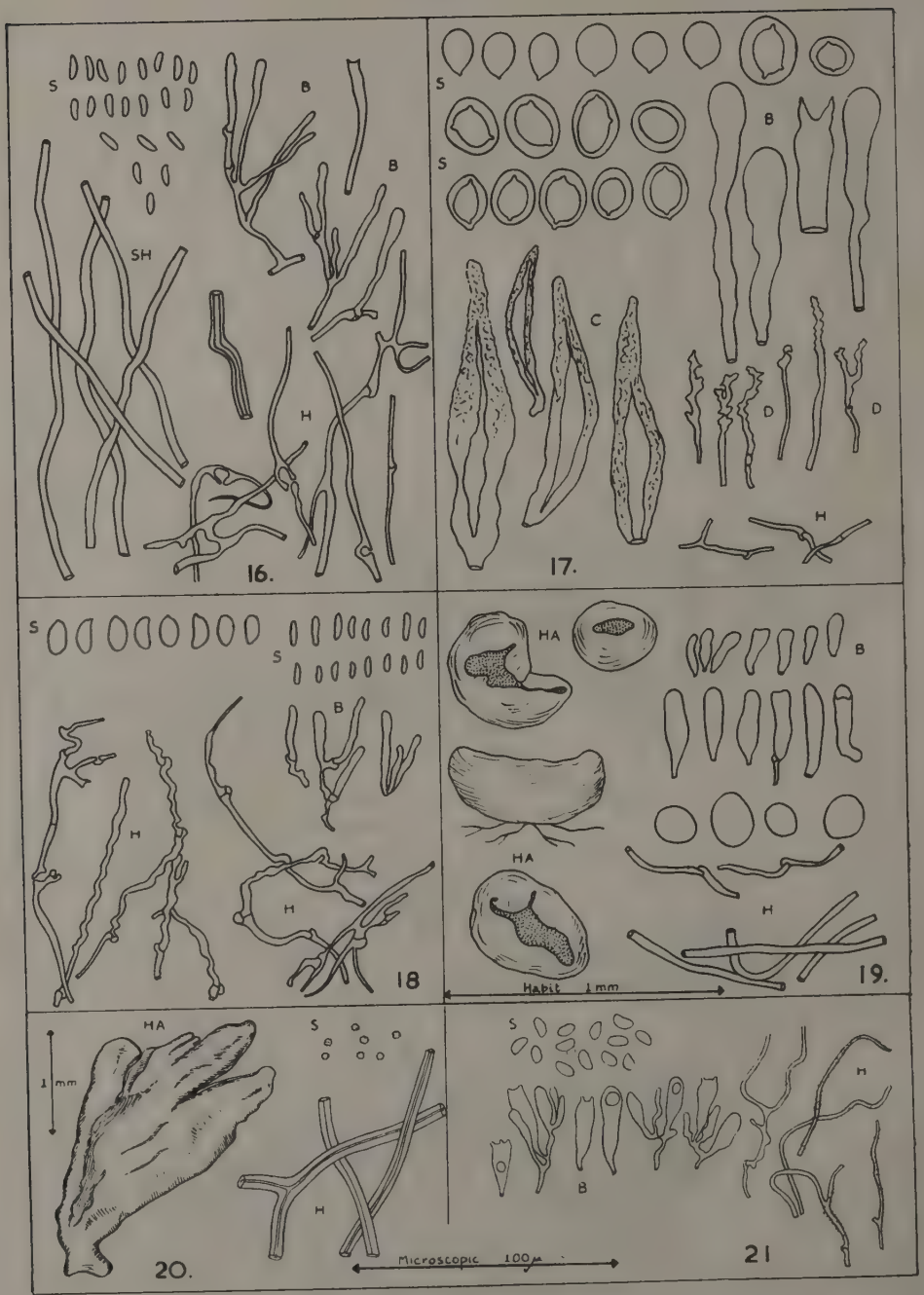

FIG. 16.—*Cytidia flocculenta*; FIG. 17.—*Cytidia habgallae*, drawn from the type of *Aleurodiscus capensis* and *Cytidia cornea*; FIG. 18.—*Cytidia simulans*, from the type; FIG. 19.—*Cyphella* sp., drawn from the type of *Femsjonia natalensis*; FIG. 20.—*Cyphella* sp., recorded by Kalchbrenner as *Cyphella friesii* Quél.; FIG. 21.—*Porotheleum incanum*.

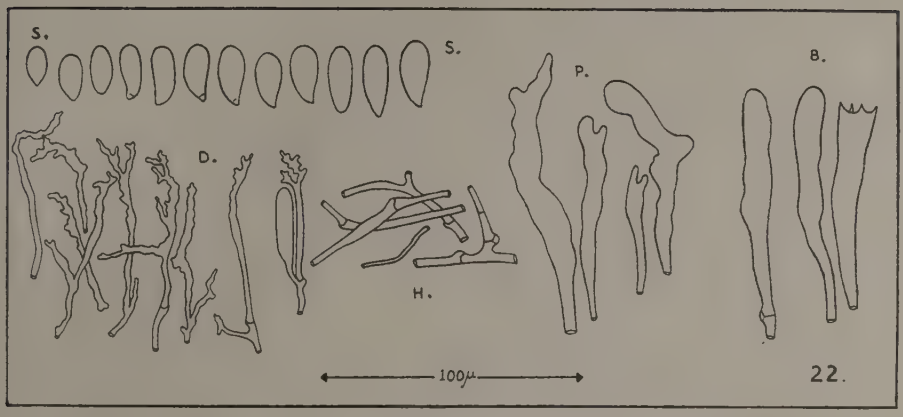

FIG. 22.—*Dendrothele duthieae*, from the type.

New and Interesting Records of South African Fungi. Part II.*

By

P. H. B. Talbot.

Sixteen species of fungi newly recorded for South Africa are described here, three of which are new species of helicosporous Fungi Imperfecti.

Arthrobotrys Oligospora Fres.: Drechsler in Mycologia 29 (1937) 464, f. 3.
Illustrations: Drechsler, loc. cit.; **Fig. 1.**

Collections: 41012, *C. O'Connor*, on Potato leaves and filter paper in a culture, Div. of Plant Pathology, Pretoria, Aug. 1954.

A branched, septate, hyaline, repent mycelium, 5–8 μ wide, gives rise to erect conidiophores. These are hyaline and either unbranched or rarely forked near the base, 4–7 μ wide, 0·5–1 mm. long, septate in the sterile basal part. The fertile part bears swollen nodes at intervals, each having a whorl of short denticles to which the conidia are attached. The apex of the conidiophore is similarly swollen and denticulate. The conidia are hyaline, thinwalled, obovate to obpyriform, with a single cross-septum situated well below the middle of the conidium. A short truncate apiculus is present and the conidia are sometimes slightly constricted at the septum. The conidia measure 13–16 × 23–27 μ.

This attractive species has not previously been recorded in South Africa. In determining the species, Drechsler's (loc. cit.) account of the species of *Arthrobotrys* has been followed. The size and shape of the conidia, and the situation of the conidial septum, are reliable characters on which to differentiate the species.

Dendryphiopsis Atra (Corda) Hughes in Canad. Journ. Bot. 31 (1953) 655, 638, figs. 89–90.
Dendryphion atrum Corda, Icones Fung. 4 (1840) 33.

Illustrations: Hughes, loc. cit.; **Fig. 2.**

Collections: 40993, *P. H. B. Talbot*, on fallen *Populus deltoides*, " Goedehoop ", Piet Retief distr. Apr. 1954.

The conidiophores are blackish-brown, stout, thickwalled, septate, about 9 μ wide, and arise from the woody substratum singly, forming conspicuous black patches. The apex of the main axis of the conidiophore is terminated by a conidium. Near the apex, " primary, secondary, tertiary, and even quaternary distinct lateral branches arise each in turn being terminated by a solitary conidium " (Hughes, loc. cit. p. 638). The conidia are very dark, thickwalled, with 1-4-(5) septa and a distinct basal hilum. The five-celled conidia measure 58–65 × 13–15 μ.

No chains of conidia were seen, a fact stressed by Hughes, but a few of the conidia possessed deep constrictions suggesting that their growth had been halted and then resumed. This species is a new record for South Africa.

Ceratocystis adiposa (Butler) Moreau in Rev. de Mycol. 17 (1952), Suppl. Colonial No. 1, p. 22.

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* Part i of this paper appeared in Bothalia 6 (1951) 183–204.

Sphaeronema adiposum Butler in India Dept. Agric. Mem. Bot. ser. i, 3 (1906) 40; Saccardo Syll. Fung. 22 (1913) 926.

Endoconidiophora adiposa (Butler) Davidson in Journ. Agric. Res. 50 (1935) 802.

Ceratostomella adiposum (Butler) Sartoris in Journ. Agric. Res. 35 (1927) 577.

Illustrations: Sartoris, l.c., figs. 1–4; Davidson, l.c., figs. 3, A–F; **Fig. 3** (conidial stage), **Fig. 4** (perithecial stage).

Collections: 39199, *van Niekerk*, on pine shooks, Pretoria, Feb. 1951.

The conidial stage of this fungus was found on pine shooks sent in for examination; subsequently the fungus was grown on malt agar, producing conidia readily and perithecia after 2½ months in culture.

Conidial Stage: The repent mycelium is first hyaline then pale coloured, branched, septate, 1·5–3·4–6·8 μ wide. Erect phialophores arise at right angles to the hyphae. They are brown, 1–4 celled, commonly two-celled, somewhat constricted at the septa, thinwalled, surmounted by a one-celled phialide. The phialides are cylindrical or slightly urn-shaped, brown, (18)–23–26 μ long, expanding into a minute collarette at the apex. Together the phialide and phialophore measure 25–50 × 5·7–6·8 μ.

The endogenous conidia are produced in basipetal succession from the phialides, and form chains of up to 20 or more extruded conidia. The conidia vary in form according to age. When young they are almost hyaline and smooth, subglobose, broadly elliptical or roughly cylindrical with rounded ends. Later they become deeply coloured, minutely warted or strongly striately verrucose, broad elliptical to cylindric-oblong, (9)–14–18 × 8–10 μ. Sometimes the last-formed conidium (nearest the phialide) may be greatly swollen, 18–22 μ in diameter, very darkly coloured, with a strongly warted or semi-spinose wall.

Perithecial Stage: The perithecia are dark, globose, about 200 μ in diameter, embedded in the substratum, with a beak 1–2 mm. long, tapering from 90 μ wide at the base to 24 μ wide at the apex. The apex is rostrate, divided into a number of brown, septate hairs, 2·4–3·2 μ wide, becoming paler towards the ends. Asci were not seen but copious ascospores extruded from the perithecium and formed an opalescent, slimy droplet at the apex of the beak. The ascospores are hemispherical, or semilunate in section, 5–6·4 × 3·3–4·8 μ.

Professor W. J. Lütjeharms very kindly suggested the genus *Endoconidiophora* thus enabling me to identify this most interesting fungus, which has not before been recorded in South Africa.

Botryosporium longibrachiatum (Oud.) Maire in Ann. Mycol. 1 (1903) 341; Saccardo Syll. Fung. 18 (1906) 510.

Botrytis longibrachiata Oudemans; Saccardo Syll. Fung. 10 (1892) 537.

Radaisiella elegans Bainier in Bull. Soc. Myc. de Fr. 26 (1910) 382, Pl. 20.

Cephalosporium dendroides Ellis & Kellerman in Journ. of Mycol. 9 (1903) 5, figs. 1–4.

Illustrations: Bainier, loc. cit. (as *Radaisiella elegans*); Kellerman, loc. cit. (as *Cephalosporium dendroides*); **Fig. 5.**

Collections: 40518, *J. E. van der Plank*, on dead potato stems and leaves in greenhouse, Div. of Plant Pathology, Pretoria, Apr. 1951.

The conidiophores are 9–12·5 μ wide, hyaline, septate, bearing numerous lateral fertile branches, or pegs where these have been detached. The fertile branches are (48)–80–110 μ long, expanding in width from the base to the apex, which is rounded or diamond-shaped in section and is 10–14 μ wide. The swollen fertile apex bears in turn a number of ampullae with innumerable, minute spicules which carry the conidia. The conidia are hyaline, smooth, one-celled, elliptical, 2·3–2·8 × 4·5–5 μ.

This fungus occurs characteristically in greenhouses on dead or decaying substrata, and is a strikingly beautiful object in the microscope. The above collection is a new record for South Africa.

Xenosporella larvalis (Morgan) Linder in Ann. Mo. Bot. Gard. 16 (1929) 322, Pl. 25, figs. 12–15.

Helicoma larvale Morgan in Cincinnati Soc. Nat. Hist. Journ. 15 (1892) 45, f. 9.

Illustrations: Linder, loc. cit.; **Fig. 6.**

Collections: 36840, *P. H. B. Talbot*, Garstfontein, Pretoria distr., Aug. 1948; 36997, *W. G. Rump* (595), on mangrove, Isipingo, 1944.

Colonies thin, effuse, powdery, gray-black or brownish. Conidiophores 4–5·3 × 33–40 μ, branched, septate, hyaline or dilute fuscous above, the basal cells fuscous, 3·5–5·3 μ wide, arising from repent, septate, branched fuscous hyphae. Conidia 18·8–22 μ diam., the filament 8 μ wide, hyaline to dilute fuscous and frequently coiled round a central cell, the cells divided off by dark septa, acrogenous, coiled once, divided longitudinally and transversely into 15–17 cells, basal cell oblong and truncate.

The subhyaline conidia divided by dark septa and the subhyaline conidiophores, also the measurements, place this species as *X. larvalis*. According to Linder the conidiophores may be up to 75 μ long, and the conidia rarely show a central cell. The collection cited on mangrove was mixed with much other fungous material, some of which was another, undetermined helicosporous mould.

Xenosporella rosea sp. nov.

Illustrations: **Fig. 7.**

Collections: Type, No. 36976, *P. H. B. Talbot*, on *Eucalyptus* stump, Hendrina road, near Ermelo, Feb. 1949.

Colonies effused over bark, coarsely granular, rosy-coloured due to the massed colour of the conidia. Conidiophores short, hyaline or very dilutely coloured, up to 10 μ long and 4–5·3 μ wide, arising from a repent mycelium composed of branched, septate, hyaline to deep fuscous hyphae, 4–7·5 μ wide, sometimes with the shorter cells constricted to appear moniliform. Conidia acrogenous, coiled $\frac{3}{4}$–$1\frac{1}{4}$ times round 1–5 deep-fuscous central cells, which are 4–6·7 μ in diameter and subglobose. The conidia are hyaline to fuscous, usually only very dilutely coloured or slightly darker at the septa, divided first by transverse walls then by longitudinal walls into 26–34 cells when mature, the coil 33–44 μ diam.; filament 14·6–18·5 μ diam.; conidia widest at the middle, tapering to the ends, the distal end rounded, the base rounded or occasionally somewhat truncate. In optical cross section the filament appears to be divided by radial walls into 4–6 cells.

This species corresponds with none in Linder's monograph of the Helicosporous Fungi Imperfecti (in Ann. Mo. Bot. Gard. 16, 1929, 318). In the size of its conidia it comes nearest to *X. thaxteri*, but the latter has black colonies, longer conidiophores and wider conidial filaments. The presence of several central cells in the conidium is characteristic of the new species.

Xenosporella rosea sp. nov.

Fungus effusus, pulverulentus, rosaceus. Conidiophora brevia, usque ad 10 μ longa, hyalina vel pallidissime colorata, 4–5·3 μ diam., ex hyphis repentis orientia. Hyphae repentae, ramosae, septatae, hyalinae vel atro-fuscae, interdum moniliformae, 4–7·5 μ diam. Conidia 33–44 μ diam., filo 14·6–18·5 μ diam., hyalina vel fusca, muriforma, cellulis 26–34, acrogena, in spiram circa 1–5 cellulas centrales, fuscas, subglobosas, $\frac{3}{4}$–$1\frac{1}{4}$-ter glomeratis.

Helicoma interveniens sp. nov.

Illustrations: **Fig. 8.**

Collections: Type, No. 40519, *P. H. B. Talbot*, on dead wood, Transvaal *sine loc.*, 1950.

Effused, forming a blackish, hirsute colony. Repent mycelium sparse, fuscous, septate, branched, 5–6 μ wide. Conidiophores erect, single or in small groups, not branched, straight or often irregularly bent, deep brown but pellucid, the terminal cell almost hyaline and rounded when immature, but tapering to a minute sporogenous tooth when fertile. The conidiophores are multiseptate, 125–230 $\times$ 5–6 μ, with up to 7 lateral sporogenous teeth in old conidiophores. Conidia acropleurogenous, borne on minute sporogenous teeth, coiled tightly $1\frac{1}{4}$ times, hyaline to very pale yellowish, with (7)–11–13 hyaline septa, the filament 6·5–8 μ wide, with both ends rounded and without constrictions at the septa; diameter of the coiled conidia 18–22 μ.

This fungus has characters in common with several other species, but differs from each in certain well-marked features. It is rather similar to *H. curtisii* Berk., but the latter differs in having fewer septa in the conidia, tapering-rounded instead of rounded basal cells to the conidia, very rarely pleurogenous conidia, and coiled spores of a smaller diameter. *H. curtisii* was figured and described in Bothalia 6 (1951) 187, f. 9. Other species which required careful comparison were *H. velutinum* Ellis, *H. mulleri* Corda and *H. ambiens* Morgan. The new species differs from *H. velutinum* in having pleurogenous conidia without constrictions at the septa. It differs from *H. mulleri* in having minute, unbranched sporogenous teeth and larger conidia and from *H. ambiens* in having unbranched conidiophores and more septa in the conidia.

Helicoma interveniens sp. nov.

Fungus effusus, subniger, hirsutus. Hyphae repentae parcae, fuscae, septatae, ramosae, 5–6 μ diam. Conidiophora erecta, non ramosa, recta vel curvata, atro-fusca, pellucida, multiseptata, 125–230 $\times$ 5–6 μ. Conidia in dentibus minutis orientia, acrogena, 18–22 μ diam., filo 6·5–8 μ diam., hyalina vel substraminea, septis hyalinis (7)–11–13, non constricta, in spiram $1\frac{1}{4}$-ter glomeratis.

Helicosporium gracile (Morgan) Linder in Ann. Mo. Bot. Gard. 16 (1929) 281, Pl. 13, figs. 4, 7; Pl. 14, figs. 9–11.

Helicomyces gracilis Morgan in Cincinnati Soc. Nat. Hist. Journ. 15 (1892) 40, f. 2.

Illustrations: Linder, loc. cit.; **Fig. 9.**

Collections: 36949, *P. H. B. Talbot*, on dead *Acacia mollissima* twigs, Atholl Expt. Station, E. Tvl., Feb. 1949.

The colonies form inconspicuous, greenish-yellow patches on wood and bark, composed of a repent mycelium of fuscous, septate hyphae, 3–4·3 μ wide, bearing occasional sporogenous teeth. The conidiophores arise erect from the repent hyphae. They are fuscous, septate, unbranched, with acute apex, 58–140 $\times$ 3·5–4·5–(7) μ, bearing minute sporogenous teeth acropleurogenously, from which the conidia arise. The conidia are hyaline, glaucous-yellowish in a mass, coiled up to $3\frac{1}{2}$ turns, filamentous, the filaments up to 1·5 μ wide, seldom showing the septa, the coils 9–15 μ diam., partly uncoiling when wetted.

Linder emphasises that *H. gracile* has dilutely coloured conidiophores and hyphae. The present specimen is pellucid throughout, though not very dilutely coloured. It differs from *H. vegetum* Nees (fide Linder, loc. cit. p. 277) in its creeping habit and the repent mycelium which bears conidia either directly or upon conidiophores.

Helicosporium lumbricoides Sacc. emend Matruchot; Linder in Ann. Mo. Bot. Gard. 16 (1929) 282, Pl. 15, f. 5.

Illustrations: Linder loc. cit.; **Fig. 10.**

Collections: 40521, *P. H. B. Talbot*, under bark of *Eucalyptus*, Fountains, Pretoria, Aug. 1952.

The colonies are effused, light- to sooty-grey, readily separable from the substratum. Conidiophores arising from a dark repent mycelium, ascending or more or less erect, subhyaline to pellucid deep brown, septate, branched and much anastomosed, 3·4–5·7 μ wide. Conidia pleurogenous, borne singly on small sporogenous teeth situated on the lower parts of the conidiophores, hyaline, the filament hygroscopic, 1·5–2 μ wide, coiled 2¼–3 times, indistinctly many-septate (10–14 septa seen); Coiled conidia 20–25 μ diam.

This specimen was found together with *Lasiosphaeria pezizula* and its conidial stage, *Helicoma curtisii*, on the same piece of bark.

It is evident from Linder's descriptions (loc. cit.) that *Helicosporium lumbricoides* and *H. lumbricopsis* Linder are rather similar. I have determined the present collection as *H. lumbricoides* because the mycelial mat is easily detached, the conidiophores are of the width given for this species and form an anastomosed network, and the conidial filaments are 2 μ or less in width and have fewer septa than in *H. lumbricopsis*.

Helicosporium ramosum sp. nov.

Illustrations: **Fig. 11.**

Collections: Type, No. 40546, *P. H. B. Talbot*, on dead wood, Fountains, Pretoria, Nov. 1951.

The colonies are sparse, white and pulverulent. The conidiophores are erect, 30–240 μ long, 3·2–4 μ wide, branched below and often anastomosing above, fuscous, subhyaline near the apex, arising from a repent mycelium. The repent hyphae are subhyaline to fuscous, 2·5–4·5 μ diam., branched and anastomosed. The conidia are hyaline, white in a mass, acropleurogenous, borne on lateral denticles on the main axis of the conidiophores, or on terminal or lateral denticles on branches of the conidiophores or repent mycelium. These branches are up to 40 μ long. The conidial coil is 19–24–(27) μ diam., the filament 1·6 μ wide, with about 15 septa, coiled 1½–2½ times.

This species is distinguished by its white colonies and by the branched anastomosed conidiophores and conidial size, a combination of characters not found in any description I have traced. It somewhat resembles *H. lumbricoides*, but differs in the way in which the conidiophores branch.

Helicosporium ramosum sp. nov.

Fungus parcus, albidus, pulverulentus. Conidiophora ex hyphis repentis orientia, erecta, 30–240 × 3·2–4 μ, fusca, subhyalina prope apicem, infra ramosa, supra anastomosa. Hyphae repentae subhyalinae vel fuscae, ramosae, anastomosae, 2·5–4·5 μ diam. Conidia hyalina, acropleurogena, in dentibus lateralis in axe principali conidiophorum vel in ramis conidiophorum et hypharum repentium orientia. Rami usque ad 40 μ longi. Conidia 19–24–(27) μ diam., filo 1·6 μ diam., septis circa 15, in spiram 1½–2½-ter glomeratis.

Coremiella ulmariae (McWeeney) Mason apud Hughes in Canad. Journ. Bot. 31 (1953) 640, figs. 92, 93.

Stysanus ulmariae McWeeney in Irish Naturalist 4 (1895) 273–277, figs. 1–6.

Coremiella cystopoides Bubák & Krieger apud Bubák in Ann. Mycol. 10 (1912) 52–53, f. ii.

Illustrations: McWeeney, loc. cit.; Hughes, loc. cit.; Bubák, loc. cit.; **Fig. 12.**

Collections: 41016, *H. J. Potgieter*, College of Agriculture, Potchefstroom, Dec. 1954.

The fungus forms small synnemata up to 1 mm. high, which are composed of a stalk up to about 0·2 mm. wide, made up of loosely interwoven parallel hyphae, which expand near the apex by repeated dichotomous branching into a subglobose head up to about 0·5 mm. diam. The whole structure is whitish to grey, with the stalk usually a darker grey. The hyphae of the synnema are sparingly branched, smooth, hyaline to pale brown, 4·8–6·4 μ diam. The terminal branches composing the head are closely septate and become transformed into rows of endoconidia, the rows being 20–140 μ long and 5 μ wide. The endoconidia are cubical to rounded, with a thickened wall bearing a minute pore in each end wall. They are dilutely coloured and about 5 μ wide. The conidia are separated by intermediate cells whose lateral walls remain thin and eventually collapse inwards to free the conidia.

This species has not been recorded in South Africa before, though Prof. Lütjeharms tells me he has isolated it many times in Bloemfontein on decaying plant stems.

Hughes (loc. cit.) gives an interesting account of the way in which the conidia are formed. I am indebted to the Director of the Commonwealth Mycological Institute for a copy of McWeeney's diagnosis of *C. ulmariae* and for the information that the Institute regards *C. cystopoides* as a later synonym.

Piricularia oryzae Cavara, Fungi Longob. exsicc. No. 49, 1891; Briosi & Cavara, I Funghi Parass. No. 188, 1892; Cavara, Atti Ist. bot. Univ. Pavia, ser. ii, 2 (1892) 280.

Illustrations: Watts Padwick, Manual of Rice Diseases (1950) f. 3.; **Fig. 13.**

Collections: 41033, *Gerrit Moerdyk*, on *Oryza sativa*, Nylstroom distr., Jan. 1953.

The fungus forms discrete to confluent whitish, greyish or light brown spots on leaves of rice, surrounded by a dark reddish brown discoloration. The whitish area is about 0·5–3 mm. in its greatest diameter, becoming tinged greyish when the fungus is well developed. The conidiophores arise singly or more often in groups. They are unbranched, hyaline to pale brown at the base and hyaline at the apices, with two or three septa, 3·2–5 μ wide and 90–140 μ long, cylindrical, attenuated to a sharp apex. The conidium is borne terminally on the conidiophore and is pushed aside by a lateral offshoot of the conidiophore which in turn bears a terminal conidium. This process may be repeated 3–4–(7) times as lateral offshoots arise in succession. Each conidium is solitary, acrogenous, hyaline to pale olivaceous, usually 3-celled (1–4 celled), subglobose when young, becoming ovate or typically pyriform, with a small spicular point of attachment, 16–25 × 7–11 μ.

Doidge (in Bothalia 5, 1950, 685) lists this species from Mocambique, but it has not hitherto been recorded in South Africa. Since the above collection was made, it has been seen fairly frequently. Watts Padwick (Manual of Rice Diseases, 1950, pp. 1–21) gives a comprehensive account of this and allied species of *Piricularia*. According to Watts Padwick, Nishikado was able to separate four species of *Piricularia* " each having distinct morphological characters and a rather narrow host range ". The following were the species dealt with by Nishikado:—

Piricularia oryzae Cav., on *Oryza sativa*;
Piricularia grisea (Cooke) Sacc., on *Digitaria sanguinalis*;
Piricularia setariae Nishikado, on *Setaria italica* and *S. viridis*;
Piricularia zingiberi Nishikado, on *Zingiber mioga* and *Z. officinale*.

In the following two entries, the determination of the fungus as to species has been made not on the morphology of the fungus, but purely by following the host range given by Nishikado, since these fungi are only critically separable from *Piricularia oryzae*. Each constitutes a new record for South Africa.

Piricularia setariae Nishikado: Watts Padwick, Manual of Rice Diseases (1950) 8. *Collections*: 39097, *S. J. Truter*, on *Setaria italica*, " Ukulinga " farm, Pietermaritzburg, Aug. 1950.

Piricularia grisea (Cooke) Saccardo, Mich. 2, p. 148; Sacc. Syll. Fung. 4 (1886) 217; Watts Padwick, Manual of Rice Diseases (1950) 8.

Trichothecium griseum Cooke in Ravenel Amer. Fungi n. 580.
Collections: 41015, *S. J. Truter*, on *Digitaria sanguinalis*, Pietermaritzburg distr., Sept. 1954.

Cordyceps tuberculata (Lebert) Maire in Bull. Soc. d'Hist. Nat. de l'Afrique du Nord 8 (1917) 165; Petch in Trans. Brit. Myc. Soc. 16 (1931) 213–217; Dingley in Trans. Roy. Soc. N.Z. 81 (1953) 338.

Akrophyton tuberculatum Lebert in Zeitschr. f. wiss. Zool. 9 (1868) 375.
Cordyceps sphingum (Schw.) Berk. & Curt. in Journ. Linn. Soc. Bot. 10 (1868) 375.
Illustrations: Petch in Trans. Brit. Myc. Soc. 9 (1924) Pl. 2, f. 12 (as *Torrubiella ochracea*); Lloyd Myc. Notes 5 (1916) 591–592, figs. 830–832 (as *Cordyceps sphingum*); Herre in Mycologia 15 (1923) 280, f. 1. (as *C. sphingum*); **Fig. 14.**
Collections: 39185, *R. Ripley*, on dead sphingid moth, College of Agriculture, Cedara, Apr. 1949; 41014, *S. J. Truter*, on dead moth, Pietermaritzburg distr., Sept. 1954.

Mycelium whitish, covering the whole under surface of a dead moth, arising from which are numerous closely aggregated cylindrical to clavate or irregular clavae, bearing perithecia in groups towards or at the apex, or frequently only on one side of the clava. The clavae are sometimes subulate, pointed and sterile. The clavae are whitish to very pale yellow, 2–3 mm. long and 0·3–0·5 mm. wide, composed of very closely interwoven hyphae, which are hyaline, septate, much branched, narrow. The perithecia are found in groups, very slightly immersed in the hyphae of the clavae, bright pale lemon yellow all over, becoming ochraceous, ovoid to conical, glabrous, somewhat pellucid, 0·3–0·4 mm. high and 0·2–0·3 mm. diam. Paraphyses absent. Asci cylindrical, tapering to the base, rounded at the apex, 3–4·8 × 225–310 μ. Ascospores 8 per ascus, filamentous, hyaline, almost as long as the asci, septate, becoming divided into part spores.

A full account of the history, synonymy and morphology of this species is given by Petch (1931, loc. cit.). This species is a new record for South Africa.

Phymatotrichum silvicolum Taubenhaus & Watkins in Amer. Journ. Bot. 24 (1937) 387–390, figs. 1–22.

Illustrations: Taubenhaus & Watkins, loc. cit.; **Fig. 15.**
Collections: No. 41033, *P. H. B. Talbot*, on moist soil, Nel Street, Pretoria, Jan. 1955.

The fungus forms a cottony to pulverulent, white mycelial mat on moist soil, later changing to a light tan or greyish colour. The hyphae are hyaline, branched, septate, commonly 7–10 μ wide, forming synnemata or remaining separate. Lateral swellings from the hyphae develop into branches which at first are simple, but later form somewhat swollen, terminal clusters of branches. These are the conidiophores and together with a part of the main stalk become minutely papillate. The conidia are attached by minute stipes and cover the whole surface of the conidiophores so that the latter are practically obscured. The conidia are hyaline, globose or subglobose to ovoid, with thin walls and without septa, 2·5–4·5 μ in diameter, produced in vast numbers.

In their excellent description of this species Taubenhaus and Watkins differentiate it from other species of *Phymatotrichum* by "the length and slenderness of the conidiophores, the characteristic apical cluster of dendroid or digitate branches which are clavate or moderately inflated, and the distribution of the actual spore-bearing area from well down on the stalk of the conidiophore to the apices of all its branches."

This fungus was first brought to my notice by Dr. S. J. Truter who found it in the Union Buildings gardens after a spell of wet weather in February. Subsequently it was found under pine trees near the Botha Statue. I am much indebted to Prof. W. J. Lütjeharms for identifying this fungus and informing me that at one time it was quite common under pine trees at the University of the Orange Free State, Bloemfontein.

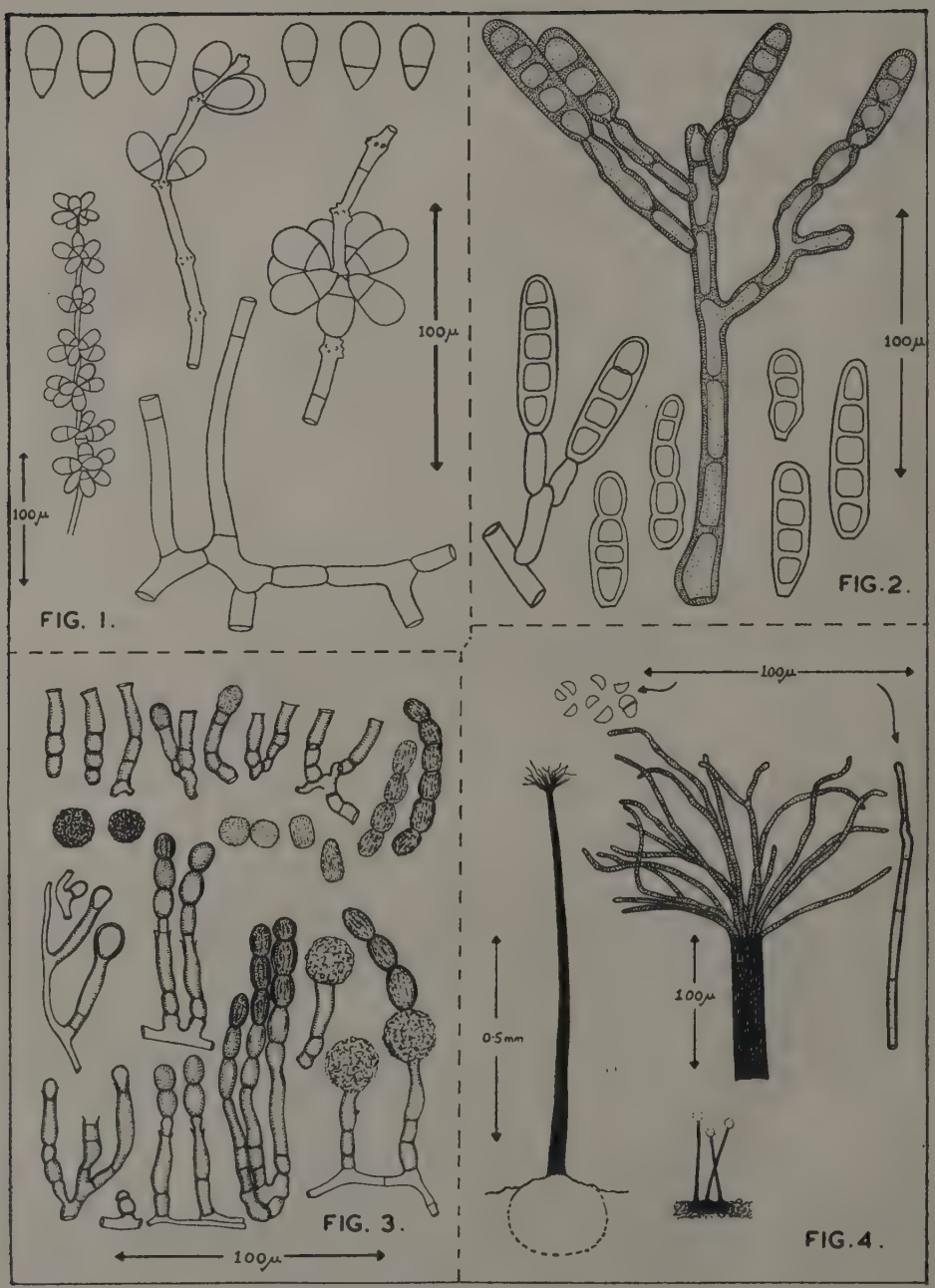

FIG. 1.—*Arthrobotrys oligospora*; FIG. 2.—*Dendryphiopsis atra*; FIG. 3.—*Ceratocystis adiposa* (conidial); FIG. 4.—*Ceratocystis adiposa* (perithecial).

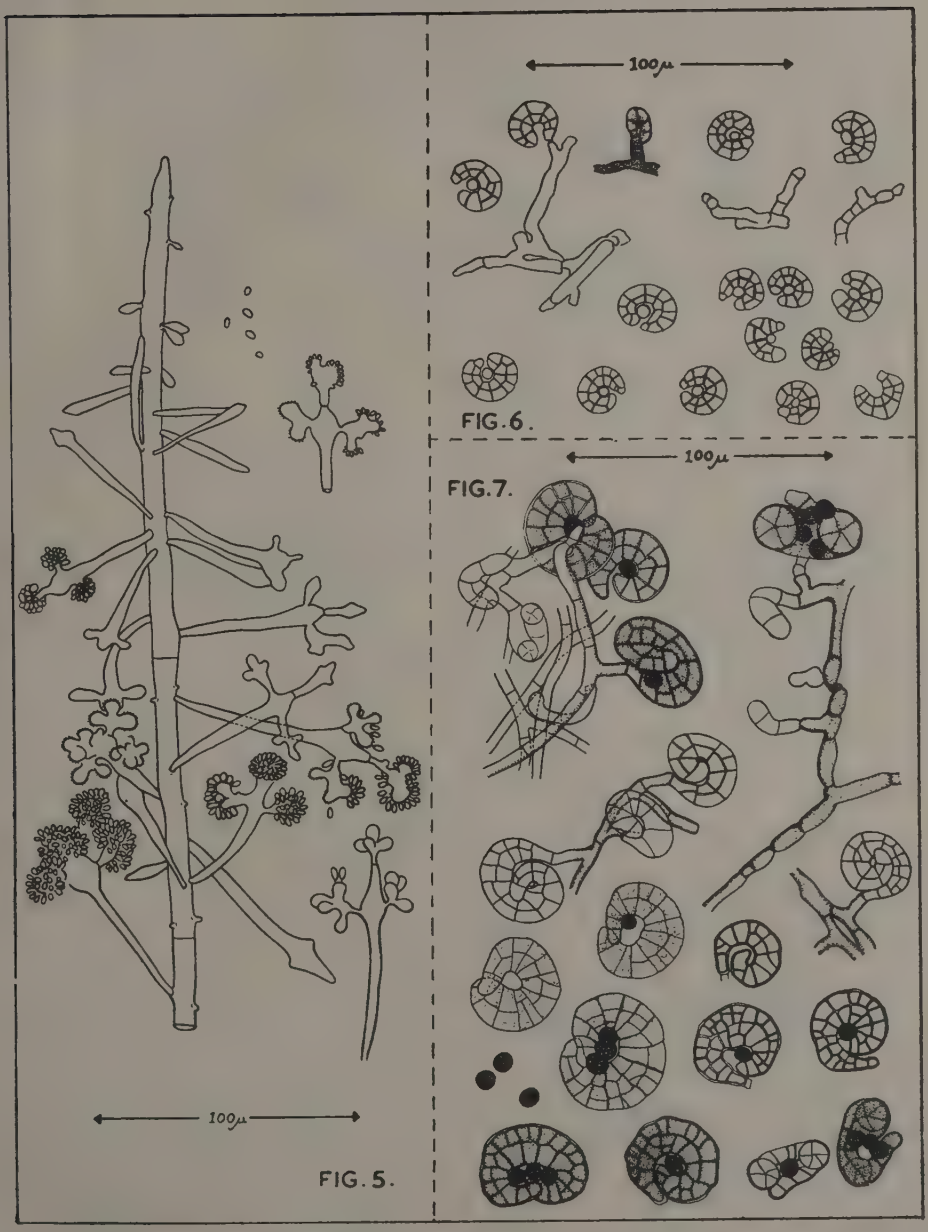

FIG. 5.—*Botryosporium longibrachiatum*; FIG. 6.—*Xenosporella larvalis*; FIG. 7.—*Xenosporella rosea*.

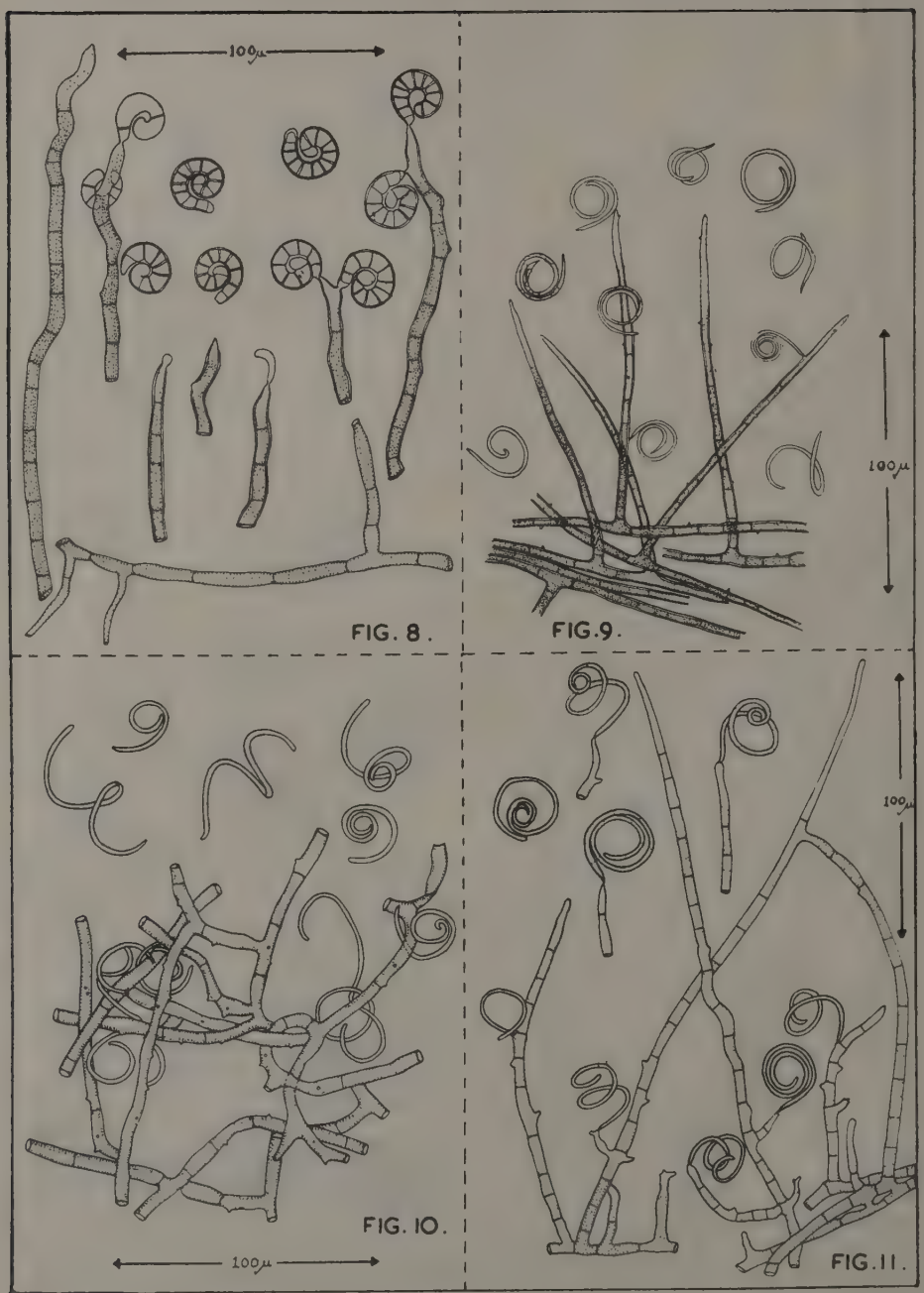

FIG. 8.—*Helicoma interveniens*; FIG. 9.—*Helicosporium gracile*;
FIG. 10.—*Helicosporium lumbricoides*; FIG. 11.—*Helicosporium ramosum*.

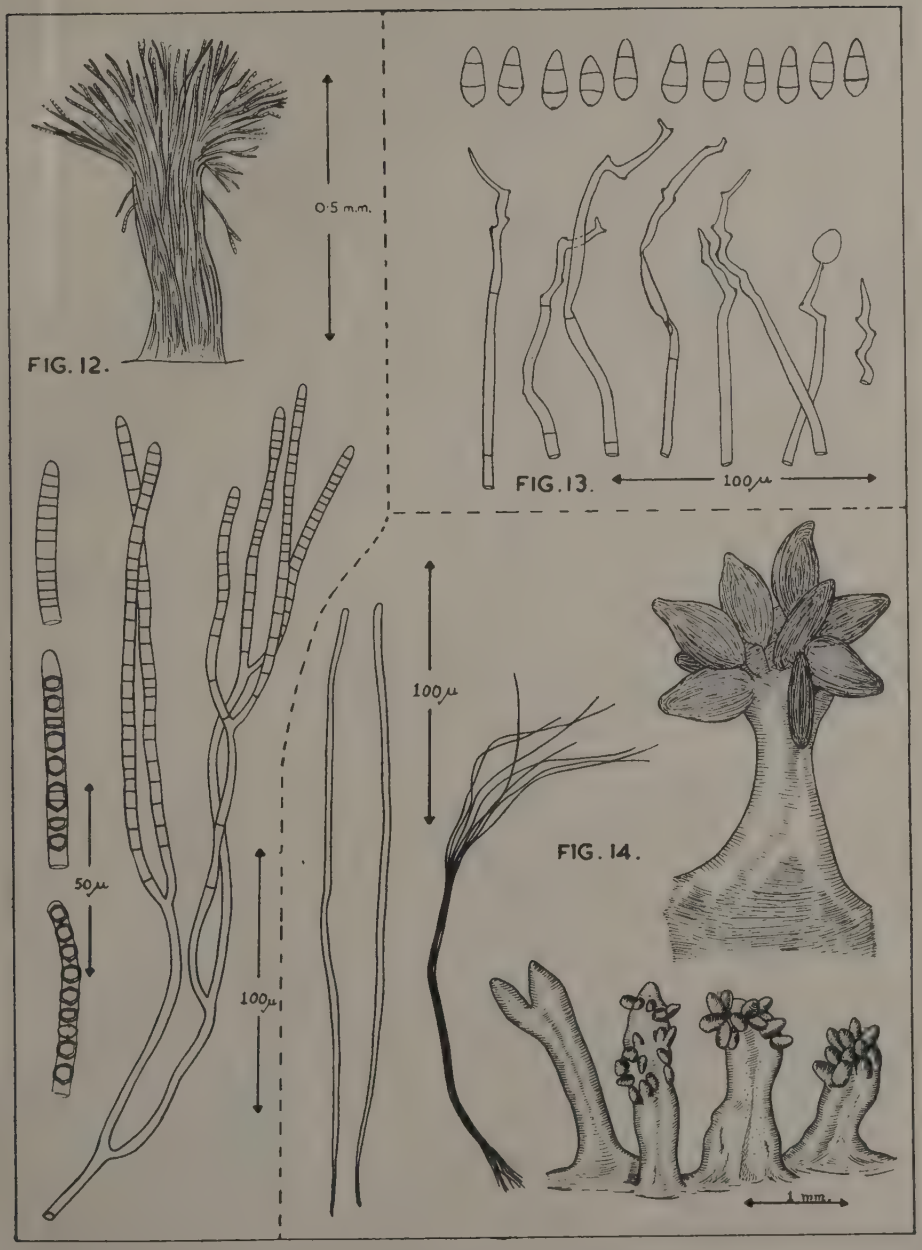

FIG. 12.—*Coremiella ulmariae*; FIG. 13.—*Piricularia oryzae*;
FIG. 14.—*Cordyceps tuberculata*.

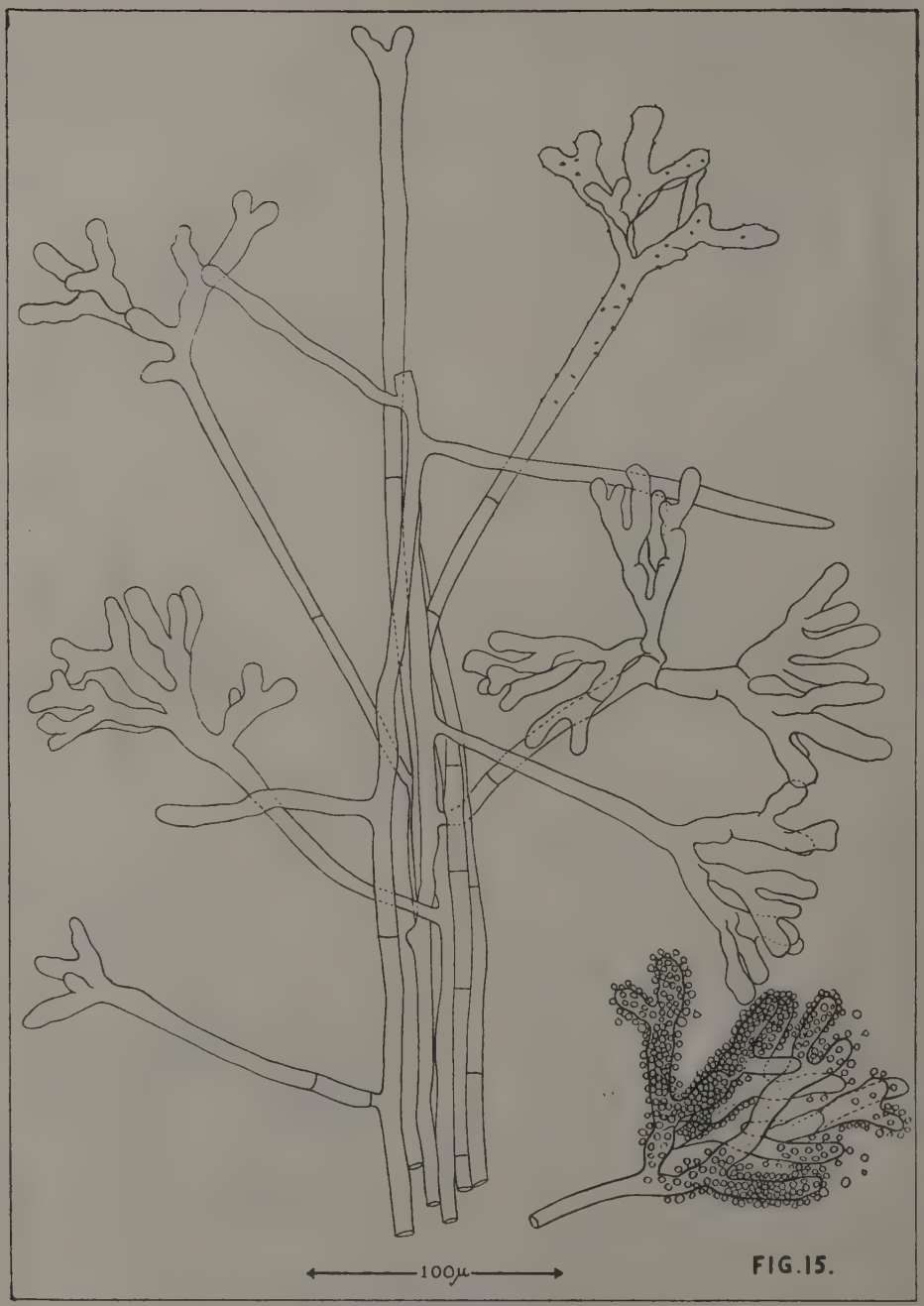

FIG. 15.—*Phymatotrichum silvicolum.*

Three Species of *Curvularia* from *Pinus*.

By

G. C. A. van der Westhuizen.

Since Boedijn (1) created the genus *Curvularia* in 1933, species have been reported from the soil (8), on *Gladiolus* bulbs (5), on vegetable seeds (3), and on grasses (2, 4, 6). This paper records two species found on pine trees and one species causing blue stain of pine timber. No previous records of *Curvularia* on such substrata have been traced.

Boedijn (1) divided the genus into three groups on the basis of the number and location of the darker, enlarged cells in the conidia. Two of the fungi described here have three-septate conidia with the two central cells larger and darker in colour than the others; these features are characteristic of the Maculans group. The third specimen has the three-septate conidia of the Lunata group, in which only the penultimate cell is larger and darker.

A. Maculans Group.

Curvularia maculans (Bancroft) Boedijn in Bull. Jard. Bot. Buitenzorg, ser. iii, Vol. 13, 1933, pp. 120–134.

Illustrations: Fig. 1; Plate 1 A.

On Czapek agar (7), the colonies are at first subhyaline but soon turn black. They are appressed, spreading, velvety, sometimes with superficial dull brown cottony hyphae, raised and tufted in the centre, with the reverse black.

The submerged mycelium is subhyaline to light brown, septate, branched, smooth or sometimes constricted at the septa and 3–6 μ wide. The aerial mycelium is darker brown, straight-walled, branched, septate and 3–6 μ wide.

The conidiophores arise as lateral branches of the aerial and submerged mycelium and are light brown in colour, and narrow at the base, mostly 3–4 μ wide. Towards the fertile region the conidiophores widen gradually. The fertile region is dark brown and geniculate with many protuberances on which the conidia are borne in whorls or irregular spirals. Upon separation of the conidia, circular scars are left on these protuberances. In this region the hyphae are 4–6 μ wide. The conidiophores vary in length from 76 μ to over 200 μ.

The conidia are elliptical to obovate and broadly rounded at the ends. They are widest at or above the middle, smooth and often slightly constricted at the proximal septum. The terminal cells are small and light brown with a conspicuous scar in the basal cell. The central cells are larger, thicker-walled, and of a dark, almost opaque brown colour. In size they vary from 18–24 μ long and 12–16 μ wide, being mostly 22 $\times$ 16 μ.

Habitat: On shoots of *Pinus patula* infected with *Diplodia pinea*, Louis Trichardt, Transvaal. May 1953.

This fungus, with its more or less elliptical conidia of which both central cells are enlarged and dark, agrees very closely with Boedijn's description except for a small but insignificant discrepancy in spore size (Boedijn's measurements were 19–26 $\times$ 11–17 μ).

Curvularia brachyspora Boedijn loc. cit.

Illustrations: Fig. 2; Plate 1 B.

On Czapek agar, the colony is at first subhyaline, soon turning dark greenish-brown to black, spreading, appressed, cottony, with the reverse black.

The submerged mycelium is hyaline or subhyaline, light greenish-brown or light brown, branched, septate, straight-walled, or constricted at the septa and 2–6 μ wide. The aerial mycelium is darker brown, straight-walled, smooth, septate and 2–6 μ wide.

The conidiophores are brown, erect, more or less straight, single, unbranched, arising as lateral or terminal branches of trailing or aerial hyphae. They are narrow at the base but widen gradually towards the darker, geniculate, fertile region where conidia are borne in spirals on fairly prominent protuberances. Their length is variable, 30–>200 × 3–6 μ.

The conidia are elliptical, widest at the middle, markedly unequal sided, rounded at the ends, three-septate with the wall slightly constricted at the outer septa. The middle septum is thick and dark. The two central cells are larger than the light brown terminal cells, and of a dark translucent brown colour. The conidia measure 16–24 × 10–14 μ, being mostly 22 × 14 μ.

Habitat: On shoots of *Pinus patula* infected with *Diplodia pinea*, Rhenosterhoek, Oct. 1952.

Like the previous one, this fungus has both the middle cells of the conidia larger and darker than the terminal ones. It differs from *C. maculans*, however, in that these cells appear clear and translucent although dark in colour, while the conidia are markedly unequal sided.

In all respects, this fungus agrees closely with Boedijn's (1) description of *C. brachyspora*.

B. Lunata Group.

Curvularia pallescens Boedijn, loc. cit.

Illustrations: Fig. 3; Plate 1, C.

On Czapek agar, the colony is at first hyaline but soon turns dark brown to black. It is slightly raised in the centre, appressed, spreading, velvety, with the reverse black.

The submerged mycelium is subhyaline to light greenish-brown, later turning olivaceous, septate, branched, more or less straight-walled or constricted by the septa, 2–8 μ wide. The aerial mycelium is more or less straight-walled, septate, light brown, and 2–8 μ wide.

Conidiophores arise as terminal or lateral branches of the submerged and aerial hyphae. They are brown, simple, erect, more or less straight, septate, narrow at the base but widening gradually towards the darker, geniculate, fertile region where spores are borne in spirals on well developed protuberances which show circular scars upon separation. Their length is very variable, 60 μ to over 200 μ × 3–6 μ.

The conidia are elongate elliptical, unequal sided or sometimes slightly bent, rounded at the ends, with a marked hilum at the proximal end. They are pale brown, smooth, three-septate with the third cell slightly larger and thicker-walled than the others, often slightly darker coloured or both central cells slightly larger and darker than the terminal cells which are sub-hyaline or pale brown, 18–26 × 8–10 μ.

Habitat: In blue-stained sapwood of *Pinus patula*, Sabie. March 1952.

This fungus differs from the previous two in having narrower conidia without marked contrast in the colour of the cells. Nor is the third cell markedly larger than the others, as is characteristic of the Lunata group.

Boedijn (1) described the conidia of *C. pallescens* as elongate elliptical, inequilateral, or slightly bent, very faintly brownish, three-septate, the third cell or both central cells larger and slightly darker than the almost colourless terminal cells, 21·5–30 × 7–11 μ. Groves & Skolko (3) described and illustrated a species of *Curvularia* whose pale brown conidia were closely similar to Boedijn's and had the third cell slightly larger and darker than the others, which is a feature of the species

described above. Marchionatto (6) reported from the Argentine that a species of *Curvularia* isolated from rice had acropleurogenous, ellipsoid, straight, geniculate conidia, 24–30 × 7–10 μ, consisting of four cells of irregular size and shape, the top and bottom ones hyaline and the middle ones greyish. Although he identified this fungus as *C. pallescens*, there is some doubt whether this is correct as it does not match Boedijn's description. Nor does it resemble the species described by Groves & Skolko, or the present fungus from *Pinus*. The last, however, agrees closely with both Boedijn's and Groves & Skolko's (3) descriptions and illustrations of *C. pallescens*, except that it appears to be slightly darker in colour than Boedjin's description would imply. Groves & Skolko's (3) illustrations, however, indicate that the conidia of their fungus were slightly darker in colour than is apparent from their description, so that there is very close similarity between their fungus and this one. The conidia of the fungus from *Pinus* are definitely brown but of a light, translucent tint, which is much lighter than in the other two species described. Other than this, there is a close similarity between this fungus and the descriptions of *C. pallescens*. For the present it appears, therefore, that this fungus should be identified as *C. pallescens* rather than be given independent specific rank.

Of great interest too is the sap-staining property of this fungus. It was isolated from a piece of log showing bluish grey streaks. Inoculation of sterilised blocks of sapwood with this fungus caused pale greenish grey stains to develop in the blocks after 14 days incubation. Continued incubation caused intensification of the stain to a bluish grey colour. This intensification of colour was associated with a colour change of the hyphae from pale greenish brown to dark brown, in the tracheids and rays, together with an increase in the number of hyphae present. Chips removed from these blocks and incubated on malt agar, yielded pure cultures of the fungus again. (Plate 1, D).

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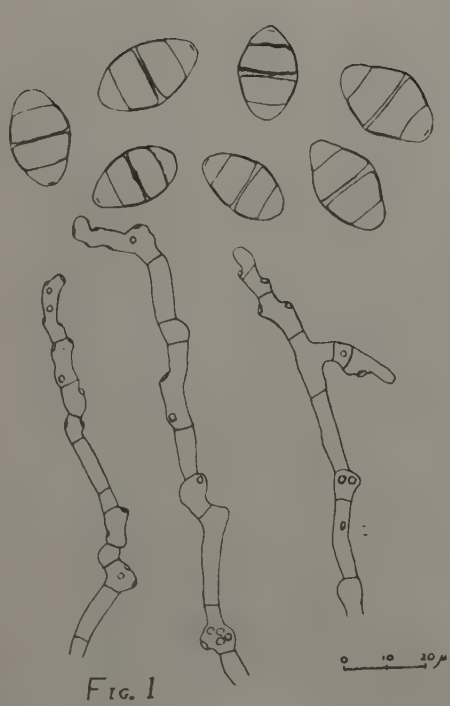
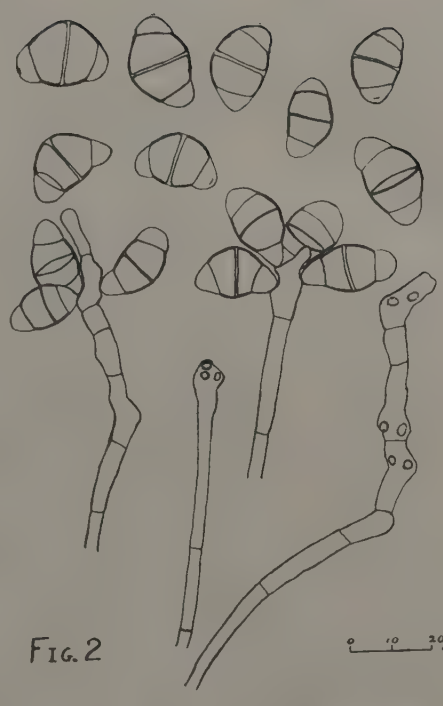




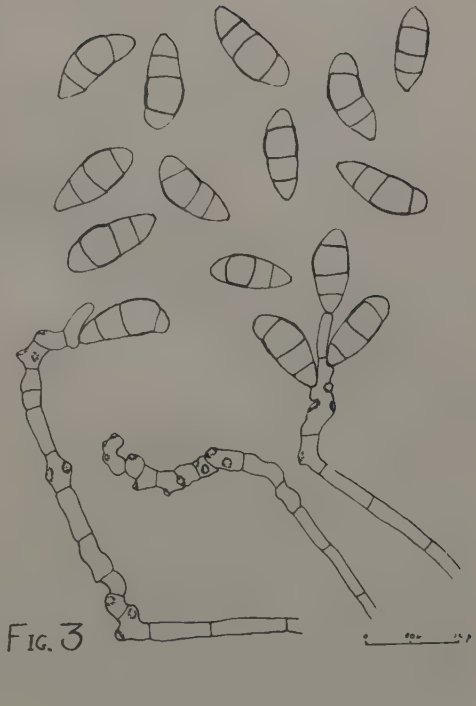


FIG. 1.—*Curvularia macyulans.*
FIG. 2.—*Curvularia brachsespora.*
FIG. 3.—*Curvularia palleens.*

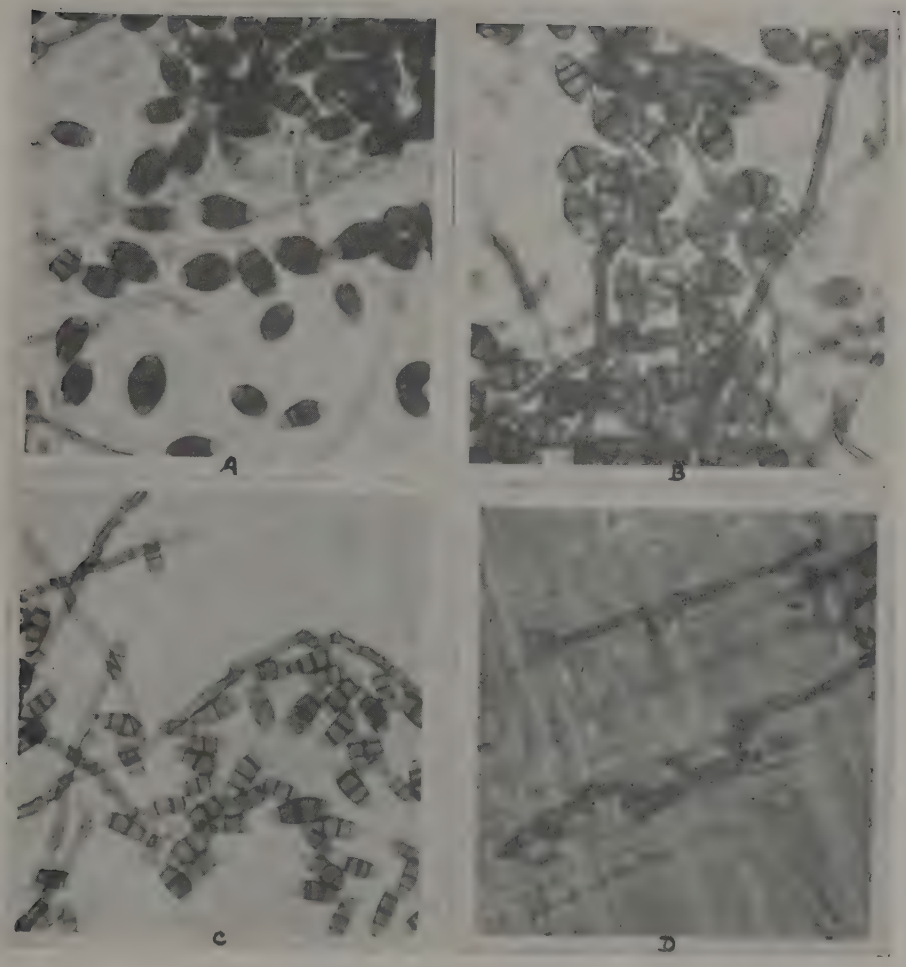


PLATE 1.

A.—*C. maculans.*

B.—*C. brachyspora.*

C.—*C. pallescens.*

D.—Hyphae of *C. pallescens* in medullary ray of *Pinus patula* (radial longitudinal section).

Notes on Certain South African Erythrina Species.

By

L. E. Codd.

Read at the meeting of the South African Association for the Advancement of Science at Bloemfontein, July 1954.

The notes recorded here are supplementary to the review of South African *Erythrina* species by Collett in Bothalia, 4: 219 (1941), which presents a sound reflection of the position, except in regard to the line of demarcation between *E. lysistemon* Hutch. and *E. caffra* Thunb. Further information also seemed desirable on the distinction between *E. latissima* E. Mey. and *E. abyssinica* Lam. (= *E. tomentosa* R. Br. ex A. Rich.). Collett omits to supplement his conclusions with supporting data and therefore it is not always clear what evidence influenced him in making his decisions. It was in order to remedy this lack, especially with regard to the correct naming of species occurring in the Kruger National Park, that the present studies were undertaken.

1. E. LYSISTEMON Hutch. and E. CAFFRA Thunb.

E. lysistemon Hutch., Kew Bull. 422 (1933) is a name that has not generally been taken up. It is based on certain Transvaal specimens, namely: Belfast District, Rietvlei, *Smuts* 66 (type); Pretoria District, *Nelson* 84; Magaliesberg, *Burke*; Rustenburg District, *Nation*; Soutpansberg District, *Hutchinson and Gillett* 4155. In distinguishing his species from *E. caffra* Thunb., he states: "Superficially the two species are very much alike, but I was induced to investigate further on account of the small and narrow vexillum and the peculiar shape of the leaflets of the Transvaal plant. That these were of importance was revealed on dissection, for in the new species the vexillary stamen was found to be quite free from the split staminal tube, whilst in *E. caffra* it is adnate to it below the middle".

Collett upholds *E. lysistemon*, but to a more limited extent citing, in addition to the type, *Leemann*, N.H. 22845 from Pretoria and *Taylor* 732 from the Soutpansberg. The rest of the Transvaal specimens and all the Natal specimens he places under *E. caffra*. An examination of the material indicated that this division was not in agreement with natural affinity and that the line of distinction between the two species would more likely be found in the area between the Kei River and southern Natal, an area from which specimens were almost completely lacking. An opportunity to study this critical zone more closely occurred in August 1953, when a tour was made from Grahamstown to Durban. A visit to the type area of *E. lysistemon* was made shortly afterwards in September 1953.

The examination of many dried and fresh flowers indicates that the stamen character stressed by Hutchinson is not a reliable one, but that general appearance of the inflorescence, together with combined measurements of floral parts, enables one to classify the material into two natural groups. The distinguishing characters are summarised in Table I and, although there is overlapping in some of the dimensions, there was practically no impression in the field of the two species grading into one another. Diagnosis in the Herbarium is most reliably based on length of the wings and keel, and the ratio of vexillum length to calyx length. In only two cases did the impression gained in the field disagree with subsequent measurement, and these were

both cultivated trees, one near Mqanduli and one at the Marburg Mission near Port Shepstone. It is felt that these two isolated cases, although to some extent intermediate in character, do not break down the distinction between the two species. It may be mentioned that the difference in leaflet shape put forward by Hutchinson does not hold good. The leaflets of *E. caffra* are constantly ovate-deltoid, while those of *E. lysistemon* vary from ovate-deltoid to hastate, so that it is not always possible to distinguish between the two species when flowers are absent. A small difference, which may have significance, became apparent when seeds of the two species were germinated in seed tins. In *E. caffra*, the hypocotyl always lengthened, raising the cotyledons about 2 cm. above soil level while, in *E. lysistemon*, the cotyledons invariably remained at soil level.

TABLE I.
Comparison of *E. caffra* and *E. lysistemon*.

	E. caffra.	*E. lysistemon.*
Peduncle, length	2·0–7·0 cm.	4·0–18·0 cm.
Vexillum, shape	Relatively short and broad, strongly arcuate, exposing the stamens	Relatively long and narrow, slightly arcuate, enclosing the stamens.
Vexillum, colour	Orange scarlet (rarely cream)	Scarlet (rarely pink or orange-scarlet).
Vexillum, length	3·8–5·4 cm.	3·7–6·8 cm.
Vexillum, breadth	2·0–3·4 cm.	1·5–2·9 cm.
Calyx, length	1·3–1·8 cm.	0·8–1·3 cm.
Wings and keel, length	2·0–2·5 cm.	0·9–1·8 cm.
Ratio of vexillum to calyx	2·3–3·4	3·7–6·6
Leaflets, shape	Ovate-deltoid	Ovate-deltoid to hastate.

E. caffra *Thunb.*, Prodr. Pl. Cap. 121 (1800); Fl. Cap. ed. Schult. 559 (1823); E. Mey., Comm. Pl. Afr. Austr. 149 (1835); E. & Z., Enum. Pl. Afr. Austr. 259 (1836); Harv. in Fl. Cap. 2: 236 (1862), pro parte; Sim, For. Fl. Cape Col. 201, t.53 (1907); Collett, l.c., pro parte.
E. viarum Tod., Nuovi Gen. e Spec. 62 (1861).
E. constantiana Micheli in Rev. Hortic. 68: 524 (1896).

PLATES 1 and 2.

TYPE: A Thunberg specimen at Uppsala "e Cap. b. Spei".

NATAL.—Port Shepstone, *Codd* 8000.

CAPE.—Libode, *Codd* 7990. Mqanduli, *Codd* 7988. Elliotdale, *Codd* 7985. Willowvale, *Kriel* FD 8865. Kentani, *Pegler* 89; 1134; *Marais* 476. Komgha, *Flanagan* 319. East London, *Smith* s.n.; *Codd* 7979. Albany, *Galpin* 67; *Codd* 7976. Alexandria, *Sim* 2135; *Archibald* 5906. Uitenhage, *Zeyher* 1691. Humansdorp, *Fourcade* 1406; 4466.

CULTIVATED.—Durban, *Collett* s.n.; *Forbes* s.n. Stegi, Swaziland, *Keith* s.n.

E. caffra occurs near the coast from Port Shepstone to Humansdorp Districts, the furthest it was seen from the coast, in the wild state, being about 35 miles in the Albany District. It is associated with coastal forest and wooded stream banks, averaging 30 to 40 feet high, but often attaining to 60 feet or more. The flowers are normally orange-scarlet in colour, though near East London an occasional tree with cream flowers is found. They are characterised by having a relatively short, broad vexillum which arches strongly away from the flowering axis, exposing the stamens. The wings and keel are comparatively long, exceeding 2 cm. in length, while the peduncle is short, rarely exceeding 5 cm. in length.

In 1861, Todaro described two species which appear to show a close relationship to *E. caffra*, namely, *E. viarum* and *E. insignis*. A reply to an enquiry sent to the Director, Instituto ed Orto Botanico dell' Universitata di Palermo, reveals that corresponding type specimens apparently do not exist, but that trees referred to under the name of *E. viarum* are growing in Palermo. A specimen at Kew collected by Wilman in Palermo under the name *E. viarum* is, according to our liaison officer at Kew, identifiable as *E. caffra*. *E. insignis* is described at some length by Todaro but, in the absence of supporting measurements, the species cannot be identified with certainty. It may be the same as the species described later as *E. lysistemon* Hutch. As there is no type specimen and hence little chance of its ever being satisfactorily placed, it is felt that the name may justifiably be disregarded.

There is little doubt that *E. constantiana* Mich. can be relegated as a synonym of *E. caffra* Thunb. The plate and description are based on a tree of unknown origin in the garden of M. Constant at Golfe Juan in the South of France. The dimensions of the flowers and leaves are somewhat larger than is usual in *E. caffra*, but this is no doubt due to cultivation. It is fairly evident that *E. lysistemon* came into cultivation in Europe and America as *E. caffra* before the true *E. caffra*, with the result that the latter received a new name. This was confirmed when cultivated specimens were sent to us for naming by Miss Elizabeth McClintock of the California Academy of Sciences, San Francisco. The trees grown in America as *E. caffra* were, in fact, *E. lysistemon*, while true *E. caffra* was cultivated under the name *E. constantiana*.

E. lysistemon *Hutch.* in Kew Bull. 422 (1933); Collett in Bothalia, 4: 223 (1941). *E. caffra* auct. plur. non Thunb. e.g., Wood, Natal Pl. 6: t.542 (1912); Phillips in Fl. Pl. S. Afr. 2: t.59 (1922); Baker, Trop. Legum. 369 (1925); Burtt Davy, Fl. Pl. Ferns Tvl. Swaz. 2: 415 (1932); Collett, l.c., pro parte; Codd, Trees and Shrubs K.N.P. 70, t.66 (1951).

PLATE 3.

TYPE: Smuts 66, Rietvlei, Belfast District, Transvaal.

S. RHODESIA.—*Gilliland* 706. Matobo, *Miller* 1643, 1879; *Plowes* 1461. Bikita, *Wild* 4417. Belingwe, *Wild* 4343.

MOCAMBIQUE.—Manica e Sofala, *Pedro and Pedrogao* 148, 7549, 7560, 8053.

BECHUANALAND.—Kanye, *Hillary and Robertson* 570.

TRANSVAAL.—Soutpansberg, *Hutchinson and Gillett* 4155; *Taylor* 732; *Bailey* in Hb. Burtt Davy H3015. Letaba, *Botha* s.n.; *Krige* 25. Waterberg, *Story* 1528; *Meeuse* 9335. Zeerust, *Gerstner* 3356. Rustenburg, *Rose Innes* 47; *Turner* 16. Krugersdorp, *Bunting* 31. Brits, *Prosser* 1356. Pretoria, *Burt Davy* 1777, 1850; *Phillips* 1648; *Mogg* 15157; 15742; *Leeman* in Nat. Herb. 22845; *C. A. Smith* 309; *Codd* 6149, 6547; *de Winter* 395; *Marais* 1; *Prosser* 1038. Belfast, *Smuts* 66 (PRE, isotype); *Codd* 8003. Lydenburg, *Barnard* 534; *Codd* 8005, 8006. Pilgrims Rest, *Smuts and Gillett* 2344. Nelspruit, *Pole Evans* 3927; *Codd* 8008; *Codd and de Winter* 5127; *van der Schyff* 13, 402. Barberton, *Galpin* 494; *Legat* H2462.

SWAZILAND.—*Codd* 7807.

NATAL.—Hlabisa, *Pole Evans* 3648. Mtunzini, *Thode* A1528. Entonjaneni, *Codd* 1916. Durban, *Medley Wood* 10016; *Thode* A1514; *Lansdell* s.n. Umzinto, *Smuts* s.n.; *Codd* 8002. Port Shepstone, *Codd* 7998, 7999; *Dyer and Dohse* 5417.

CAPE.—Bizana, *Codd* 7993, 7994, 7997. Libode, *Codd* 7991. Mqanduli, *Codd* 7986, 7987. Elliotdale, *Codd* 7983. Engcobo, *Codd* 7981, 7982.

According to Baker, l.c., the species occurs also in Nyasaland and Angola. Its distribution overlaps that of *E. caffra* from Port Shepstone to Bashee Mouth and extends further inland. It inhabits drier situations than *E. caffra*, such as scrub forest, coastal sand dunes, dry savannah and rocky, wooded slopes, rarely exceeding 40 feet in height and usually considerably less. The flowers are normally brilliant scarlet, the main variants being a pink-flowered form near Umkomaas and a tree with orange scarlet flowers at Marburg Mission near Port Shepstone. The vexillum is relatively long and narrow, arched to a smaller extent than in *E. caffra* and folded to enclose the stamens. The wings and keel are comparatively short, rarely exceeding 1·5 cm. in length, while the peduncle is seldom shorter than 6 cm.

Specimens from Southern Rhodesia and the Northern Transvaal (Soutpansberg District) are characterised by having a shorter vexillum, varying from 3·7–5·1 cm. as against 4·6–6·2 cm. for those with a more southerly distribution. In all other respects they appear to be identical with the more southern (typical) specimens and therefore there are insufficient grounds for separating this northern form as a distinct variety.

2. E. LATISSIMA E. Mey. and E. ABYSSINICA Lam.

There was at one time a tendency to place *E. latissima* E. Mey. (type: Drege, between Umgazana and Umzimvubu Rivers) as a synonym of the more tropical species, *E. abyssinica* Lam. (= E. tomentosa R. Br. ex A. Rich.). Examples are to be found in Wood, Natal Pl. 4: t. 384, 385 (1906); Sim, For. Fl. Cape Col. 201 (1907); and Marloth, Fl. S. Afr. II. 1: 81 (1925). More recent authors, such as Burtt Davy (1932) and Collett (1941), uphold the name *E. latissima* for the South African plant, but they omit to give reasons for their decision.

An examination of available herbarium material indicated that corolla length could serve as a basis for sorting the material into two groups, which differed to some extent in leaf size and texture and also in geographical distribution. The two groups meet in Southern Rhodesia but do not appear to grade into one another, thus providing support for the view that they represent two distinct species. It has not been possible to study this problem personally in the field, but useful confirmatory evidence has been supplied by Dr. H. Wild of Salisbury Herbarium and Mr. D. C. H. Plowes of Nyamandhlovu Pasture Research Station. The main distinguishing characteristics are summarised in Table II. In addition, observers state that in *E. abyssinica* the calyx is bright red, especially in the young stage. The colour is not evident in herbarium specimens, so it is not known how constant a feature it is. In *E. latissima*, the calyx has a rusty brown colour.

TABLE II.

Comparison of *E. latissima* and *E. abyssinica*.

	E. latissima.	*E. abyssinica.*
Vexillum, length	4·0–5·5 cm.	2·8–3·8 cm.
Wings, length	1·7–2·4 cm.	0·7–0·9 cm.
Keel, length	1·3–1·8 cm.	0·5–0·7 cm.
Terminal leaflet, shape	More or less rotund, broader than long	Broadly ovate to rotund, often longer than broad.
Terminal leaflet, length	9·5–21·0 cm.	5·5–14·0 cm.
Terminal leaflet, breadth	11·0–29·0 cm.	6·0–14·0 cm.

On the basis of the above distinctions, it appears necessary to add *E. gibbsae* Bak. (type: Gibbs 73, Matoppos) to the list of synonyms of *E. latissima* given by Collett, l.c. Although the type has not been seen, no constant characters could be found for separating specimens from the Matoppos from *E. latissima*.* A point arising out of this investigation but falling outside its scope, is the validity of the name *E. abyssinica* Lam. The original description is hardly sufficient to sustain it and enquiries have failed to reveal the existence of a type specimen. The species is fully described by A. Richard in his Tent. Fl. Abyss. 1: 213, 214 (1847), where it is identified with a Quartin Dillon specimen, and it may be noted that *E. tomentosa* R. Br. ex A. Rich. is described for the first time in this work also.

The distribution of *E. abyssinica* is from Abyssinia, through tropical Africa to Southern Rhodesia and Mocambique, without entering the Union of South Africa, while *E. latissima* extends from Southern Rhodesia and, probably, the highlands of Mocambique, through eastern Transvaal and Natal to the Transkei.

* In a recent communication, Mr. Plowes informs me that, having compared flowering specimens of *E. gibbsae* and *E. latissima*, he considers that the two may be distinct.

PLATE 1.—*Erythrina caffra* Thunb., photograph of type specimen at Uppsala Herbarium.

PLATE 2.—*Erythrina caffra* Thunb., East London (Codd 7979).

PLATE 3.—*Erythrina lysistemon* Hutch., Rietvlei, Nelspruit District (Codd 8008).

The Schotia Species of Southern Africa.

By

L. E. Codd.

Schotia is essentially a genus of southern Africa and the species occurring in Southern Rhodesia, the southern part of Mocambique, the Union of South Africa and South West Africa form a closely related group. An examination of available material led to the conclusion that only four species, namely *S. afra* (L.) Bodin, *S. latifolia* Jacq., *S. brachypetala* Sond. and *S. capitata* Bolle, can be upheld in this region out of some 15 specific names published.

The specimens seen include those of the National Herbarium, Pretoria, and of the following Herbaria, whose assistance in sending their material on loan is gratefully acknowledged: Bolus Herbarium; South African Museum Herbarium; National Botanic Gardens, Kirstenbosch; Albany Museum Herbarium, Grahamstown; and Natal Herbarium, Durban. When citing specimens seen, the abbreviation indicating the Herbarium is omitted where the gathering is represented in the National Herbarium, Pretoria. Otherwise, only one Herbarium is cited, though this is not necessarily the only Herbarium with representative material.

Among the specimens examined were eight which presented difficulty because they showed floral characters intermediate between those of *S. afra* and *S. latifolia*. Three resembled *S. latifolia* in general appearance but, unlike that species, possessed stamens free to the base; the remaining five showed a close similarity to *S. afra*, but the stamens were united to a variable extent at the base. These two groups were not themselves very uniform and did not convey the impression of being worthy of specific or varietal rank. They are treated here as hybrids and it may be of significance that they occur in the area where both *S. afra* and *S. latifolia* are found. However, it is desirable that they should be subjected to further study in the field and from a cyto-genetical view-point in order that a reliable evaluation of their status can be made.

One of the published species, *S. alata* Thunb., proved, on examination of a fragment of the type kindly sent to us by the Director of Uppsala Herbarium, not to be a *Schotia*, but is identifiable as *Erythrophysa alata* (E. & Z.) Hutch.

The *Schotia* species of southern Africa have little economic value. The wood is described as being hard and close grained with a pleasing finish when worked, but stems suitable for timber purposes are seldom found. The leaves of *S. afra* are browsed by livestock, while the young seeds, roasted or boiled, formed an article of diet of primitive tribes and early settlers. It is said to be in reference to this property that the popular name Boerboon (literally, " farmer's bean ") came to be applied to the species. *S. latifolia* has since been called the Bosboerboon (Forest Boerboon) and *S. brachypetala* the Huilboerboon (Weeping Boerboon), the latter containing copious quantities of nectar in the flowers. Schotias have attractive flowers in shades of pink and red, but their slow growth reduces their value as horticultural subjects.

The generic description which follows is based on the species included in this treatment. It has not been possible to form an opinion on the species described from the more tropical parts of Africa owing to the scanty material of them in South African herbaria. The few specimens seen give the impression of having a somewhat distant relationship with the typical species. Baker (1926) suggested that the genus should be limited to plants with an obconical or cylindrical receptacle and broad, imbricate sepals which are not reflexed at flowering time. It is probable that closer study will indicate that some tropical species at present in *Schotia* are, in fact, generically distinct.

SCHOTIA.

Jacq., Coll. 1: 93 (1787), *nomen conservandum*; Schreber, Gen. Plantar. 279 (1789); Lam., Ill. 2: t. 331 (1797); Bodin in Thunb. Gen. Nov. Pl. (as " Scotia "), 9: 130 (1798); Thunb., Fl. Cap. ed. Schult. 388 (1823); DC., Prod. 2: 507 (1825); Harv., Gen. S.A. Pl. ed. 1: 92 (1838); Endl., Gen. 6785 (1839); Harv. in Fl. Cap. 2: 273 (1861); Benth. & Hook., Gen. Pl. 1: 581 (1865); Oliv. in Fl. Trop. Afr. 2: 309 (1871); Marloth, Fl. S. Afr. II. 1: 56 (1925); Baker, Leg. Trop. Afr. 708 (1926); Phillips, Gen. S.A. Fl. Pl. ed. 2: 394 (1951).

Guajacum Linn., Sp. Pl. ed. 1: 382 (1753), *pro parte.*

Theodora Medik., Theod. (1786); Harv., Gen. S.A. Pl. ed. 1: 92 (1838); Taub. in Engl. & Prantl, Pflanzenfam. III. 3: 138 (1894); Pflanzenw. O.-Afr. C 198 (1895); Harms in Veg. der Erde, 9: 454 (1915).

Omphalobium Jacq. f. ex DC., Prod. 2: 508 (1825).

Shrubs or trees, unarmed. *Leaves* paripinnate, alternate; stipules small, caducous; leaflets coriaceous, often oblique, entire, rarely less than 3 pairs and not exceeding 18 pairs, the lower usually smaller than the upper. *Inflorescence* many-flowered in short lateral or terminal panicles, in some species produced from the old wood; branches of inflorescence stout, often woody. *Bracts* small, membranous, caducous. *Pedicels* usually short. *Calyx* leathery, often red in colour; tube obconical, subcampanulate or cylindrical, persisting in the fruiting stage; lobes 4 (rarely 5), often unequal, imbricate, longer than the calyx tube, broad and not reflexed at flowering, deciduous. *Corolla* pink or red in colour; petals 5 or, in one species, some or all petals may be reduced to linear filaments, imbricate, inserted in the mouth of the calyx tube, early deciduous. *Stamens* 10, inserted with the petals, free or connate below; filaments linear, usually of two lengths, alternating, often coloured; anthers elliptic, attached medially, versatile, 2-celled, dehiscing longitudinally. *Ovary* oblong, oblique, stipitate, the stipe attached to one side of the calyx tube; ovules several to many; style terete; stigma terminal, capitate. *Pod* woody, 1 to several seeded, oblong or broadly linear, compressed, sometimes curved, beaked, sub-indehiscent, with a hard, peripheral margin which persists, often with the seeds attached, after the eventual dehiscence of the valves; seeds ovoid to globose, slightly compressed, light brown, with or without a yellow aril.

Type Species: *S. afra* (L.) Bodin.

The genus is named in honour of Richard van der Schot, Chief Gardener of the Imperial Garden of Schönbrunn, and friend and travelling companion of Jacquin's, during the latter's travels in America.

Key to the Species of Southern Africa.

Stamens free to the base	
Leaflets usually exceeding 5 pairs and less than 1 cm. in width.	
Leaflets 6–12 pairs, 3–10 mm. wide	1 (*a*). *S. afra* var. *afra*.
Leaflets 11–18 pairs, 1·5–3 mm. wide	1 (*b*). *S. afra* var. *angustifolia*.
Leaflets 4 or 5 pairs, usually exceeding 1 cm. in width	5. *Hybrid Form A.*
Stamens connate at the base	
Petals 5, normally developed	
Inflorescence subglomerate on abbreviated lateral branchlets; leaflets rarely exceeding 2·5 cm. in length	
Staminal tube not forming a distinct sheath	6. *Hybrid Form B.*
Staminal tube forming a distinct sheath which projects as a narrow rim	2. *S. capitata.*
Inflorescence relatively lax, terminal; leaflets usually exceeding 2·5 cm. in length	3. *S. latifolia.*
Petals all, or some, reduced to linear filaments	4. *S. brachypetala.*

1. **S. afra** (*L.*) *Bodin*, aggregate species.

(*a*) var. **afra.**

(*b*) var. **angustifolia.**

Shrub or small tree up to 7 m. high, often with a twisted trunk; branchlets glabrous to tomentulose. *Leaves* paripinnate, 2·5–8 cm. long and 2–3 cm. broad, tending to fold along the rhachis, glabrous to tomentulose; stipules ovate, acuminate, 2 mm. long, caducous; petioles 2–4 mm. long; rhachis channelled above, rarely narrowly winged; leaflets 6 (rarely less) to 18 pairs, usually opposite, sessile, linear or oblong to elliptic, 5–25 mm. long and 2–10 mm. broad, rounded and often oblique or gibbous at the base, apex obtuse, usually mucronate. *Inflorescence* a congested panicle, subglobose, 4–8 cm. in diameter, borne on short lateral branchlets or, rarely, terminal, composed of many flowers; inflorescence branches abbreviated, usually hidden by the flowers, semi-woody, glabrous to tomentulose. *Bracts* small, scale-like, caducous. *Pedicels* 3–9 mm. long. *Calyx* red, leathery; tube obconical to cylindrical, 3–8 mm. long and 3–5 mm. broad; lobes usually 4, sometimes one lobe emarginate, rarely divided to the base producing 5 lobes, obovate to oblong, concave, 6–11 mm. long and 5–10 mm. broad. *Corolla* red to pink; petals 5, oblanceolate, slightly clawed, veined, 10–18 mm. long and 3–7 mm. broad. *Stamens* 10, free to the base; filaments 15–20 mm. long, exceeding the corolla by 3–8 mm.; anthers elliptic, 2 mm. long. *Ovary* oblong, compressed, 5–7 mm. long and 2 mm. broad, oblique, stipitate; stipe 5–6 mm. long; style 8–14 mm. long; stigma capitate. *Pod* as in generic description, 5·5–12 cm. long and 3–3·5 cm. broad. *Seeds* ovoid to roundish, slightly compressed, 12–15 mm. long and 8–12 mm. broad, pale brown, aril very small or absent.

Thunberg published the binomial *Schotia afra* without supporting description or citations in his Prodromus (1794), but this *nomen nudum* does not invalidate the later effective publication of the combination by his student, Bodin, in Thunberg's Gen. Nov. Pl. 9: 130 (1798). Some authorities credit Thunberg with the combination, e.g. *S. afra* (L.) Thunb. in Juel's Plantae Thunbergiana (1918). However, Bodin is clearly cited as the author of the work on *Schotia* in Thunberg's Gen. Nov. Pl. and so it seems reasonable to accept him as the author of the combination. It may be noted that Thunberg, in his Flora Capensis (1823), reverts to the epithet *S. speciosa*.

According to Acocks (Veld Types of South Africa, 1953), *S. afra* is a common species of the Karroid Valley Bushveld and the allied Fish River and Sundays River Scrub of the eastern Cape Province. It also occurs in the Noorsveld, the Succulent Mountain Scrub or Spekboomveld, the Little Karoo and, further north, in the Orange River and Namaqualand Broken Veld. In a personal communication he expresses the opinion that the variation seen in plants occurring in these various veld types could well be included within the limits of one species.

Harvey in Flora Capensis upheld three varieties in addition to the typical form, namely: var. *angustifolia*, var. *tamarindifolia* and var. *ovalifolia*. In the present treatment, only one variety is separated as distinct from typical *S. afra*, namely *S. angustifolia*, with leaflets more numerous and narrower than the typical form. Var. *tamarindifolia* is recognisable in flowering specimens by the calyx tube being cylindrical instead of obconical but otherwise it appears to be identical with typical *S. afra* and is not considered to be varietally distinct. Var. *ovalifolia* shows characters intermediate between *S. afra* and *S. latifolia* and evidence points to its being a hybrid between these two species. It is discussed more fully under the heading Hybrid Form A (p. 529).

Var. (*a*). **S. afra** (*L.*) *Bodin* var. **afra.** *S. afra* (L.) Bodin in Thunb. Gen. Nov. Pl. 9: 130 (1798) (as "Scotia"); Thunb., Prodr. Pl. Cap. 79 (1794), *nomen nudum*. *Guajacum afrum* L., Sp. Pl. ed. 1: 382 (1753); Mill., Gard. Dict. ed. 8: (1768).

S. speciosa Jacq., Coll. 1: 93 (1787); Icon. Pl. Rar. 1: 8, t. 75 (date ?); Schreber, Gen. Plantar. 279 (1789); Willd., Sp. Pl. 2: 537 (1799); Andr., Bot. Rep. 5: t.348 (1804); Thunb., Fl. Cap. ed. Schult. 388 (1823); DC., Prod. 2: 508 (1825); E. & Z., Enum. Pl. Afr. 261 (1836); Harv. in Fl. Cap. 2: 274 (1861); Sim, For. Fl. Cape Col. 207, t.57 (1906); Marloth, Fl. S.Afr. II. 1: 57 (1925). Var. *tamarindifolia* (Afz. ex Sims) Harv., l.c.

Theodora speciosa Medik., Theod. 16 (1786); Harv., Gen. S.A. Pl. ed. 1: 92 (1838); Taub. in Engl. & Prantl, Pflanzenfam. III. 3: 138 (1894).

S. tamarindifolia Afz. ex Sims in Bot. Mag. t.1153 (1809); DC., Prod. 2: 508 (1825); E. Mey., Comm. Pl. 161 (1836).

Citations prior to 1753.—Boerh., Lugd. 2: 57 (1727); Walth., Hort. Leipzig, 2: t.2 (1735); Linn., Hort. Cliff. 489 (1737); Van Roy., Hort. Lugd. 536 (1740).

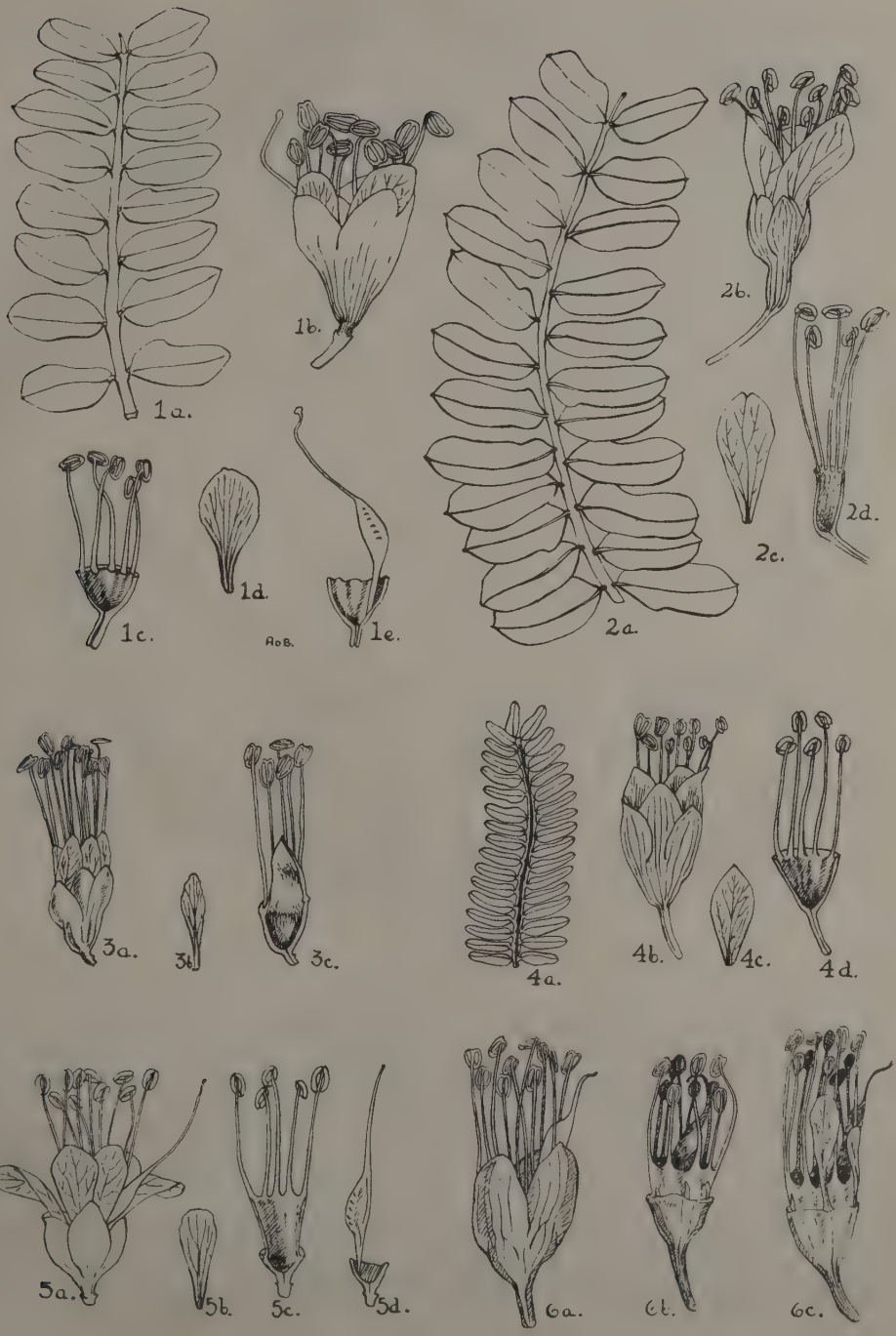
FIGS. 1 and 2.

TYPE.—No. 532·4 in the Linnaean Herbarium. Of the two specimens in the Linnaean Herbarium, both sterile, numbered 532·3 and 532·4, respectively, the latter, being more characteristic of the species, is chosen as the *lectotype*. Types of synonyms: *S. speciosa* Jacq., the plate in his Collecteana; *S. tamarindifolia* Afz. ex Sims, *Masson*, " Africa australis prope bon. spei ", in the British Museum; *Theodora speciosa* Medik., no information is available as to whether a corresponding specimen exists.

CAPE.—Albany: 16 miles E. of Grahamstown, *Codd* 9237; Fraser's Camp, *Maguire* 633 (NBG). Bathurst: Port Alfred, *Rogers* 16637; *Tyson* s.n.; *White* 57 (GRA); *Schonland* s.n. (GRA); Kowie, *Salisbury* 121 (GRA). Alexandria: Debega Valley, *Galpin* 10661; Bushmans River Poort, *Johnson* 863. Uitenhage: *Ecklon and Zeyher* 47 (BOL); *Theron* 232; Swartkops River Valley, *Zeyher* 2447; Aloes, *I.L. Drège* 3126; Addo, *Brynard* 202; *Gill* 10 (BOL): *Lang* in Hb. Marloth 6840; Despatch, *Holland*, 337 (GRA). Port Elizabeth: Redhouse, *Marloth* 13040; *Patterson* 524 (BOL); Enon, *Thode* A2643; Perserverance, *Rodin* 1282 (BOL); Coegakamma to Addo, *I. L. Drege* 584 (GRA). Humansdorp: *Phillips* 3350; Slang River, *Fourcade* 1795 (BOL). Knysna: Keurbooms River, *Taylor* 29. Oudtshoorn: Between Calitzdorp and Oudtshoorn, *Barker* 628 (NBG). Mossel Bay: *McGaffin* s.n. (GRA). Laingsburg: Seven Weeks Poort, *de Jager* s.n. (BOL). Ladismith: *Pole Evans* H19101; Swartberg, *Marloth* 2945. Riversdale: Still Bay, *Muir* 92; *Taylor* 92; Skilpadgat, 5 miles N.W. of Albertina, *Taylor* 209 (NBG). Swellendam: Eierpoort, *Compton* 11920 (NBG); Anysberg, *Stokoe* 8390. Montagu: *Marloth* 8129; between Dobbelaarskloof and Karreevlakte, *Hall* 881 (NBG). Robertson: Along Komas River, *Acocks* 8618.

Jacquin's plates of *S. speciosa* are among those whose dates of publication are not known with certainty. The subject is discussed by Schubert in Contrib. Gray Herb. 154: 3–23 (1945), who tentatively places the date of plate 93 of the Collecteana (accepted as the earlier) as 1787. The date of publication of Jacquin's Icones Plantarum Rariorum, Vol. I, is frequently accepted as 1781, the date of the title page to that work but, on page 8, in the text relating to plate 75, he refers to the plate in his Collecteana, and to the publication of *Theodora speciosa* by Medikus. Therefore plate 75 of the Icones is undoubtedly the later of the two.

FIG. 1.—*Schotia afra* var. *afra*, a, leaf; b, flower; c, longitudinal section; d, petal; e, ovary. FIG. 2.—*S. afra* var. *afra*, form with cylindrical calyx tube, a, leaf; b, flower; c, petal; d, longitudinal section. FIG. 3.—*S. capitata*, a, flower; b, petal; c, longitudinal section. FIG. 4.—*S. afra* var. *angustifolia*, a, leaf; b, flower; c, petal; d, longitudinal section. FIG. 5.—*S. latifolia*, a, flower; b, petal; c, longitudinal section; d, ovary. FIG. 6.—*S. brachypetala*, a, flower; b, flower with calyx lobes removed, showing reduction of all petals; c, form with petals partially reduced. All life size.


1a.
1b.
1c.
1d.
1e.
A.o.B.
2a.
2b.
2c.
2d.
3a.
3b.
3c.
4a.
4b.
4c.
4d.
5a.
5b.
5c.
5d.
6a.
6b.
6c.

Included in var. *afra* are the plants with, normally, 6–11 pairs of leaflets, oblong to elliptical, 10–17 mm. long and 4–10 mm. wide. These plants may again be subdivided into two groups on the basis of calyx shape, one group with the calyx tube obconical in shape while, in the other group, the calyx tube is cylindrical, though the distinction is not always clear cut. The form with the obconical calyx tube appears to have been in cultivation in Europe from early in the 18th Century and is the form figured by Jacquin, so it can be fairly safely assumed that the specimens in the Linnaean Herbarium belong here. This form is centred mainly in the Little Karoo, occurring in the Montagu, Swellendam, Ladismith, Laingsburg and Oudtshoorn Districts, with outliers as far east as the Knysna District.

The second group with the calyx tube cylindrical in shape is indistinguishable vegetatively from the preceding, having much the same number, size and shape of leaflets. Thus no advantage can be seen in separating it as a distinct variety. It was described as *S. tamarindifolia* Afz. ex Sims and was placed as *S. speciosa* var. *tamarindifolia* by Harvey in Flora Capensis. Plants of this nature are distributed mainly to the east of the preceding group in the districts of Humansdorp, Uitenhage, Alexandria, Bathurst and Albany, but they are also recorded further west in the Riversdale District.

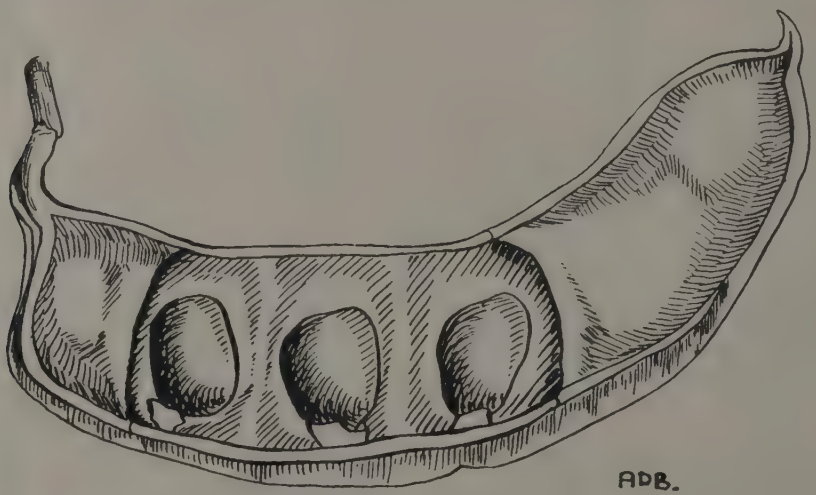


FIG. 7.—*S. afra* var. *angustifolia*, pod, life size.

S. tamarindifolia is described as having five calyx lobes. This is unusual but not unknown. The usual number is four but, occasionally, the largest lobe is notched or split at the apex. In extreme cases, which are very rare and apparently not constant even in one inflorescence, the division continues to the base of the lobe, with the result that five lobes instead of four are present. Of the 41 flowering specimens examined, 10 possessed flowers with one calyx lobe notched for a quarter or more of its length, while in two of these the division continued to the base of the lobe, resulting in five instead of four calyx lobes.

Var. (*b*). **S. afra** (*L.*) *Bodin* var. **angustifolia** (*E. Mey.*) *Harv.*, in Fl. Cap. 2: 274 (1861).
S. parvifolia Jacq., Fragm. 85, t. 136 (1809).
S. angustifolia E. Mey., Comm. Pl. Austr. Afr. 161 (1836).
S. venusta Mason in Journ. Roy. Hort. Soc. Lond. 39: t. 14 (1913), *nomen nudum*.

FIGS. 4 and 7.

TYPE.—Drège, between Kunap and Kat Rivers. Of the two specimens cited by E. Meyer, this appears to be the more representative of the variety and is therefore chosen as the *lectotype*. An isotype is at the British Museum Herbarium.

CAPE.—Butterworth: Kei River, *Bayer* in N.H. 31017 (NH); Kei Bridge, *Codd* 9242. Komgha: *Flanagan* 1322. Queenstown: *Saunders* in N.H. 10602 (NH); Gwatyn, *Galpin* 8108; near Balotwa, *Thorns* s.n. (NBG). King William's Town: *Sim* 2139; north side of Mitchell's Pass, *Esterhuysen* 13235 (BOL). Keiskammahoek: Boma Pass, *Acocks* 9111. Middledrift: *Salisbury* 290 (GRA). Victoria East: *Lewis* in SAM 66637; 4 miles above Fort Cox, *Gillett* 4592; Curries Kloof, *Bennie* 441. Graaff Reinet: *Bolus* 621 (BOL). Prieska: 20 miles N.W. of Prieska, *Bryant* in Hb. Bol. 25613 (BOL). Kenhardt: 7 miles W. of Pofadder, *Thorne* s.n. (SAM). Namaqualand: *Krapohl* in Hb. Bol. 20589 (BOL); Groot Rozynbosch, *Pearson* 3824 (SAM). Gordonia: Bokputs, *Marsh* in Hb. Marl. 6527; Aughrabies Falls, *Esterhuysen* (BOL).

SOUTH WEST AFRICA.—Warmbad: Skunsberg Quelle, south of Warmbad, *Dinter* 5133; Eendoorn, *Galpin* s.n.

Var. *angustifolia* is distinguished from the typical by the more numerous, smaller and narrower leaflets, possessing 12–18 pairs of leaflets which are 5–12 mm. long and 1·5–3 mm. wide. The calyx tube is obconical, resembling the typical form, but the pedicels are slightly shorter. *S. parvifolia* Jacq. appears to belong here, though Jacquin's figure shows too few leaflets. The distribution of this variety is further east and more inland than the typical, occurring in the Districts of Butterworth, Komgha, King William's Town, Victoria East, Queenstown, Graaff Reinet and, further north, in Prieska, Gordonia, Kenhardt, Namaqualand and South West Africa, to mention the most important.

2. **S. capitata** *Bolle* in Peters Reise Mossamb. Bot. 18 (1862); Oliv. in Fl. Trop. Afr. 2: 310 (1871); Sim, For. Fl. Port. E. Afr. 51 (1909); Baker, Leg. Trop. Afr. 710 (1926).

S. tamarindifolia Afz. ex Sims var. *forbesiana* Baill. in Adansonia, 6: 197 (1865–66).

Theodora capitata (Bolle) Taub. in Engl. & Prantl Pflanzenfam. III. 3: 108 (1894); Pflanzenw. O.-Afr. C 198 (1895).

S. transvaalensis Rolfe in Kew Bull. 248 (1906); Burtt Davy, Fl. Pl. Ferns Tvl. Swaz. 2: 326 (1932); Phillips in Fl. Pl. S. Afr. 15: t. 574 (1935) excl. descr. " up to 30 ft. high "; Codd, Trees and Shrubs, Krug. Nat. Park, 68, t.63 (1951).

FIG. 3.

Shrub or slender tree up to 7 m. high, sometimes sub-scandent; branchlets glabrous to sparingly pubescent; bark grayish. *Leaves* paripinnate, 3·5–8 cm. long and 2·2–4·5 cm. broad, tending to fold along the rhachis, glabrous to sparingly pubescent; stipules 2–3 mm. long, ovate, acuminate, caducous; petioles 1–6 mm. long; rhachis narrowly winged, especially towards the apex; leaflets 3–5, rarely 6 pairs, opposite, sessile, elliptic or sub-rotund or obovate, 1·5–2·5 (rarely up to 3·5) cm. long and 1–1·8 (rarely 2) cm. broad, obtuse to acute at the base, often oblique, obtuse or acute at the apex, usually mucronate. *Inflorescence* a congested panicle, subglobose, 3–8 cm. in diameter, borne terminally or, more usually, on short lateral branchlets; inflorescence branches much abbreviated, semi-woody, glabrous to tomentulose. *Bracts* less than 1 mm. long, scale-like, caducous. *Flowers* scarlet, sessile or subsessile with pedicels rarely exceeding 1·5 mm. long. *Calyx* deep red, leathery; tube obconical, 3–4 mm. long, persistent; lobes 4, subequal, obovate to elliptic, concave, 6–9 mm. long and 3 mm. broad. *Corolla* scarlet; petals 5, oblanceolate, clawed, veined, 10–14 mm. long and 3–4 mm. broad. *Stamens* 10 united at the base for 3–4·5 mm. forming a sheath round the ovary stipe, the sheath being

split open on the side where the stipe is attached to the calyx tube, and projecting as a narrow, irregular rim; one or two stamens often free to the base on the split side; filaments linear, 12–16 mm. long, exceeding the corolla by 3–5 mm.; anthers elliptic, 1·5–2 mm. long. *Ovary* oblong, compressed, 4–5 mm. long and 2 mm. broad, stipitate; stipe 4–5 mm. long and 1 mm. thick, adnate to one side of the calyx tube; style terete, 13–15 mm. long; stigma capitate. *Pod* as in the generic description, 4–12 cm. long and 2·5–3·5 cm. broad. *Seeds* ovoid, slightly flattened, 8–12 mm. long, pale brown, with a large, compressed, yellow aril.

TYPE.—Peters, Inhambane. The holotype in Berlin-Dahlem Herbarium appears to have been destroyed and enquiries have thus far failed to reveal the existence of an isotype. Types of synonyms: *S. transvaalensis* Rolfe, P. Oranje s.n., Barberton District, in Herb. Kew; *S. tamarindifolia* var. *forbesiana* Baill., Forbes 32, Delagoa Bay.

MOCAMBIQUE.—Sul do Save: Mutamba, near Inhambane, *Gomes e Sousa* 2171; Moambo, *Pedrogao* 25, 26, 218; between Inharrime and Panda, *Pedro and Pedrogao* 1887; between Matola and Umbeluzi, *Pedro and Pedrogao* 897, 901; between Unianga and Mazivila, *Pedro and Pedrogao* 1441; between Chamusca and Nalasi, *Pedro and Pedrogao* 1271, 1294; Canissado, *Pedro and Pedrogao* 1297; between Ginja and Chibuto, *Pedro and Pedrogao* 1536; Ginja, *Pedro and Pedrogao* 2133; Lourenco Marques, *Borle* 18, 88, 597; *Torre* 6370; *Bremekamp* in T.M. 30198; Bela Vista, *Swierstra* in T.M. 16390; near Goba, *Torre* 6470; Maziminhama, *Myre* 1247; Maputo, *Hornby* 2537.

TRANSVAAL.—Pilgrims Rest: 7½ miles N.E. of Skukuza, *Codd and de Winter* 5063. Nelspruit: Skukuza, *Stevenson-Hamilton* s.n.; 21 miles N.E. of Pretorius Kop, *Story* 3934; Klokwene, *van der Schyff* 196; Sigaas, *van der Schyff* 774. Barberton: Komatipoort, *Rogers* 12609; Kaapmuiden, *Thorncroft* 611.

SWAZILAND.—Flats below Stegi, *Rodin* 4559; Sitilo River, near Gollel, *Pole Evans* 3395 (4).

NATAL.—Ingwavuma: Ndumu, *Gerstner* 4004 (NH); Pongola River, *Boocock* 47. Ubombo: *Gerstner* in NH 22865; between Otobotini and Ubombo, *McClean* in NH 18472. Ngotshe: Candover, *Galpin* 13608. Hlabisa: False Bay, *Gerstner* 4761; *Ward* 697, 690. Mahlabatini: 6½ miles N. of Mahlabatini, *Codd* 1932; near Mahlabatini, *Acocks* 11666; Black Umfolosi, *Swynnerton* 47. Lower Umfolosi: Umfolosi River, *Wager* in T.M. 22386; Umfolosi Game Reserve, *Ward* 1468 (NH); Nagana Research Station, *Kluge* 18 (NH); Umhlatuzi Valley, *Lawn* 795, 1744 (NH).

The holotype of *S. capitata* was apparently lost with the partial destruction of Berlin-Dahlem Herbarium and our liaison officer at Kew has been unable to locate an isotype in any of the British Herbaria. Thus, in the absence of a type specimen, circumstantial evidence had, to some extent, to be relied upon in deciding to place *S. transvaalensis* as a synonym of *S. capitata*. All the *Schotia* specimens seen from Mocambique can be placed in two species, namely, *S. brachypetala* and the species here outlined. Gatherings made in the neighbourhood of Inhambane, the type locality of *S. capitata*, fail to reveal a third species. The description of *S. capitata* by Bolle is based on a flowering specimen without leaves; it could apply to our present conception of the species and, fortunately, the description of the five petals excludes *S. brachypetala*. The name *S. capitata* was taken up by Oliver in the Flora of Tropical Africa and subsequent authors, for example, Taubert (1894), Sim (1909) and Baker (1926), usually with the opinion expressed that *S. tamarindifolia* var. *forbesiana* is probably a synonym. There is a specimen at Kew of Forbes 32, type of the latter variety, and it has been reported as being conspecific with Oranje s.n., type of *S. transvaalensis*.

S. capitata shows a superficial resemblance to some of the specimens cited under the heading " *S. latifolia* X *S. afra*, Form B " but is distinguished from this group and, in fact, any other species, by the characteristic and relatively specialised staminal sheath which encloses the stipe of the ovary. The sheath is composed of, usually, 8 stamens fused at the base for 3–4·5 mm., being open to the base on the side to which the stipe is attached to the calyx tube. The sheath is smooth on the inside and is projected as an uneven rim about 1 mm. above the junction of the stamens. One or two stamens are usually free to the base on the open side of the sheath. The leaf rhachis is usually more distinctly winged in *S. capitata* than in any of the other species.

In the absence of flowers, it is often difficult in the herbarium to separate *S. brachypetala* from some forms of *S. capitata* because there is overlapping in the size of leaflets. In the field, they can be distinguished by the difference in habit, *S. brachypetala* forming a round-topped tree from 25 to 40 feet or more in height, with a trunk up to 18 inches in diameter. *S. capitata* is normally a shrub with several slender, ascending branches, frequently intertwined in thorn scrub, with which it is frequently associated. More rarely it forms one to several slender, erect stems up to 20 feet in height and 4 to 6 inches in diameter.

3. **S. latifolia** *Jacq.*, Fragm. 23, t.15, f.4 (1809); DC., Prod. 2: 508 (1825); Jacq. f., Ecl. Pl. 2: t.126 (1844), in textu; E. Mey., Comm. Pl. 162 (1836); E. & Z., Enum. Pl. Afr. 262 (1836); Harv., Gen. S.A. Pl. ed. 1: 92 (1838); Harv. in Fl. Cap. 2: 274 (1861); Sim, For. Fl. Cape Col. 206, t.57 (1906); Marloth, Fl. S. Afr. II. 1: 57 (1925).
Omphalobium Schotia Jacq. f. ex DC., Prod. 2: 508 (1825), in synonomy.
S. diversifolia Walp. in Linnaea, 13: 541 (1839).
S. cuneifolia Gandoger in Bull. Soc. Bot. Fr. 60: 462 (1913).

FIGS. 5 and 8.

Tree up to 10 m. high; trunk up to 25 cm. in diameter; branchlets glabrous to tomentulose; bark smooth, dull grey to reddish brown. *Leaves* paripinnate, 6–10 cm. long and 5–8 cm. broad, glabrous or pubescent; stipules ovate, acuminate, 4 mm. long, caducous; petioles 0·5–2 cm. long; rhachis slightly channelled above, winged in the juvenile state; leaflets 3–5 pairs, usually opposite, sessile, elliptic-oblong to obovate, 2·5 (rarely less)–6 cm. long and 1·4–3 cm. broad, cuneate to rounded at the base, oblique, rounded or acute at the apex, rarely mucronate, the upper leaflets the largest. *Inflorescence* a relatively open panicle, terminal to main or lateral branches, 8–15 cm. long and 6–10 cm. wide; inflorescence branches patent, semi-woody, 3–8 cm. long, glabrous to tomentulose. *Bracts* scale-like, caducous. *Pedicels* less than 2 mm. long. *Calyx* reddish brown, leathery; tube very short, turbinate, 1·5–2 mm. long, persistent; lobes 4, subequal, obovate, concave, 5–7 mm. long and 4–5 mm. broad. *Corolla* pink to flesh colour; petals 5, equal or, occasionally, 1 slightly reduced, oblanceolate, veined, 9–11 mm. long and 2·5–3 mm. broad. *Stamens* 10, connate at the base for 0·5–3 mm., the staminal sheath split open on the side to which the ovary stipe is attached to the calyx tube; filaments linear, 10–14 mm. long, exceeding the corolla by 2–3 mm.; anthers elliptic, 1·5–2 mm. long. *Ovary* oblong, compressed, 4–5 mm. long and 2 mm. broad, stipitate; stipe 2 mm. long, adnate to one side of the calyx tube; style terete, 10–11 mm. long; stigma scarcely differentiated. *Pod* as in the generic description, 5–14 cm. long and 3–4·5 cm. broad. *Seeds* ovoid, flattened, 11–14 mm. long, pale brown with a large, compressed, yellow aril.

TYPE.—The plate in Jacquin's Fragmenta. Types of synonyms: *S. diversifolia* Walp., syntypes, Ecklon and Zeyher from " Uitenhage and Albany " and three Drège specimens collected at Glenfilling, Keiskamma and Zandplaat, respectively. *S. cuneifolia* Gand., Penther 2516 (or 2561, see later discussion), Cape of Good Hope.

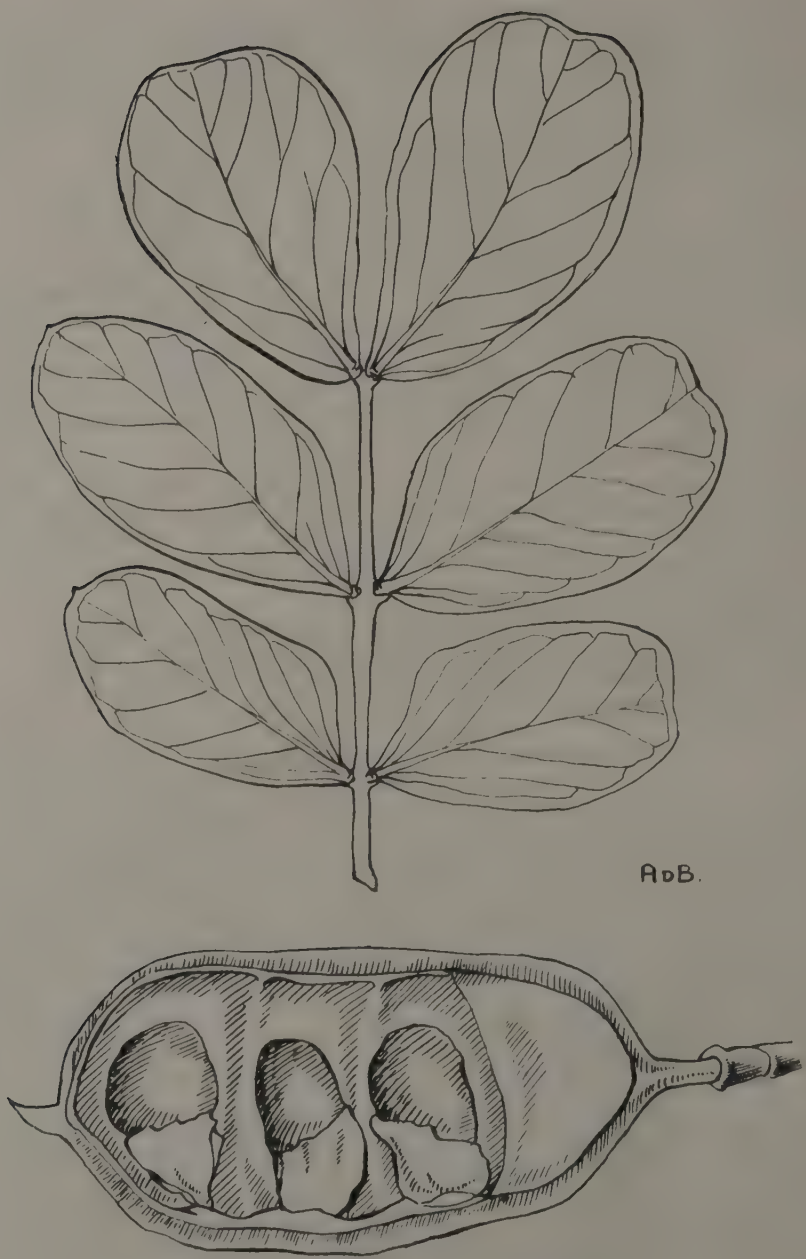


FIG. 8.—*S. latifolia*, leaf and pod, life size.

CAPE.—Engcobo: 2 miles N. of Engcobo, *Codd* 7981a. Kentani: *Pegler* 593. Komgha: *Flanagan* 712; Queenstown: Junction Farm, *Galpin* 8109. Stockenstroom: Brambledene, between Alice and Seymour, *Barker* 2898 (NBG). Stutterheim: Dohne, *Acocks* 8955, 9501. East London: *Penther* 2561 (W); *Galpin* 3141; *Nanni* 152; Blind River Valley, *C. A. Smith* 3841; mouth of Keiskamma River, *Galpin* 7695. Peddie: Ebb and Flow, *Maguire* 619 (NBG). Albany: *Marloth* 10877; Howieson's Poort, *MacOwan* 77 (BOL); Gowieskloof, *Bennie* 669 (GRA); 1½ miles S.W. of Grahamstown, *Comins* 983; 15 miles N. of Grahamstown, *Maguire* 661 (NBG). Bathurst: Fish River Valley, *Schlechter* 6104; Port Alfred, *Rogers* 959; *Potts* 169 (GRA); Kowie West, *Burtt Davy* 7887. Uitenhage: *Gill* 16 (BOL); *Patterson* 2209 (GRA); " Uitenhage and Albany ", *Ecklon and Zeyher* 1701; Paarde Poort, *Bolus* 1547 (BOL); Kamachs, *Long* 1277; Enon, *Thode* 22644; Zuurberg, *Holland* 300 (GRA). Port Elizabeth: *Kensit* 7 (BOL); between Coega and Sundays River, *Zeyher* 672 (BOL) in part (?); Van Staadensberg Gorge, *MacOwan* 2458 (GRA), Baakens River, *I. L. Drege* 659; Van Staadens Kloof, *Taylor* 832; Bethelsdorp; *Paterson* in T.M. 12299, 25844; Swartkops River, Springfield, *Forest Dept.* 150 (GRA). Humansdorp: Loerie, *Dix* 208. Uniondale: 9 miles from Joubertina. *Fourcade* 5079 (BOL). Knysna: Keurbooms River, *Fourcade* 169 (BOL); *Compton* 4457 (NBG); Keurbooms River Pass, *Fourcade* 1992 (BOL). George: *Pappe* s.n. (GRA).

CULTIVATED.—Kirstenbosch, *Henderson* 1891 (NBG); Botanic Garden, Durban, *Medley Wood* 1891, 5017, 8689 (NH); near Durban, *Medley Wood* 9260 (NH); Barberton (?), *Thorncroft* ex hort NBG; Cape Town, *Marloth* 9315.

Jacquin's plate lacks flowers and was made from an immature plant stated to be five years old, grown from seed sent by Georg Scholl, who collected in the Cape Province for the Imperial Gardens at Schönbrunn from 1785 to 1797. As far as is known, his travels did not take him further eastward than East London, which would not bring him into the area of distribution of *S. brachypetala*, a species indistinguishable vegetatively from *S. latifolia*. Fortunately this is not the only evidence we have relating to the identity of this plate. De Candolle, Prod. 2: 508 (1825), gives a description of the flowers of *S. latifolia*, based on an unpublished plate (published later in Ecl. Pl. 2: t.126, 1844) by Jacquin fil., who had given it a manuscript name of *Omphalobium Schotia*. It may be presumed that this is the same plant as that figured by the elder Jacquin, and subsequent authors have accepted its identity. It is not known if herbarium specimens corresponding to the plates are in existence.

S. diversifolia Walp. is based on Ecklon and Zeyher 1701 (represented in Grahamstown, South African Museum and the National Herbarium, Pretoria) and three Drège specimens collected respectively at (*a*) Glenfilling, Albany District; (*b*) Keiskamma; and (*c*) between Zandplaat and Komga. The Drège specimens have not been seen, but all the localities fall within the distribution range of *S. latifolia*, and the description by E. Meyer in his Comm. Pl. 162 (1836) agrees with this species.

The following is a copy of the description of *S. cuneifolia* Gandoger: " Foliola ampla oblonga, apice subrotundata, mucronata nec retusa, basi cuneata, marginibus undulatis, rami floriferi glaberrimi, patentes, late angulosi, cymae laxiflorae. HAB.: Cap. (Penther n. 2516). A S. latifolia Jacq. recedit foliolorum coriaceorum forma staminibusque longioribus. Legumen maximum, 9–10 cm. longum, 3 cm. latum, glabrum." In response to an enquiry made to the Naturhistorisches Museum, Vienna Dr. Rechinger informs me that he was unable to find a *Schotia* specimen with the Penther number 2516. There is, however, a sheet of *S. latifolia* labelled Penther 2561 from " Distr. East London ". A portion of this specimen was kindly sent to us on loan and was confirmed as being *S. latifolia* Jacq. Whether Gandoger's No. 2516 is a typographical error is not certain, but it seems possible that the type may in fact be No. 2561. In any case, the description gives no adequate grounds, in the light of modern information on *Schotia* species, for separating this species from *S. latifolia*.

Sim in his Forest Flora of the Cape Colony, page 206, states that " . . . it grows to a tree 30 to 50 feet and is common throughout the Eastern and Transkei Conservancies and Natal." Acocks (Veld Types of South Africa, 1953), in addition to recording the presence of *S. latifolia* in the Fish River Scrub, Southern Valley Bushveld and Alexandria Forest, cites it as occurring in the Zululand Thornveld (pp. 39, 40). In the absence of flowers, it is practically impossible to distinguish *S. latifolia* from *S. brachypetala* and thus the two might be confused in the field. *S. brachypetala* is known to occur as far south as Umtata, but no herbarium specimens identifiable as *S. latifolia* are known from the wild to the east of Engcobo and Kentani Districts in the Transkei. The Medley Wood specimens from Durban and the Thorncroft specimen from Barberton are considered to be from cultivated trees. Thus there is need for more collecting to be done in the Transkei and Pondoland areas in order to demonstrate clearly whether the two species overlap or not.

S. latifolia grows in forest margins and dry scrub and forms a small, round-topped tree 15 to 30 feet in height (Marloth's reference to a 50 foot tree in the Pirie Forest must be regarded as exceptional). It is probably evergreen or, like some other species of *Schotia*, the leaves may be shed for a very short period before the flowers appear. The flowers are relatively small, pinkish in colour and are borne in profusion in terminal panicles.

4. **S. brachypetala** *Sond.* in Linnaea, 23: 39 (1850); Harv., Thes. 21. t.32 (1859); Fl. Cap. 2: 274 (1861); Wood, Natal Pl. 4: t.390 (1906); Marloth, Fl. S.Afr. II. 1: 57 (1925); Baker, Leg. Trop. Afr. 709 (1926); Burtt Davy, Fl. Pl. Ferns Tvl. Swaz. 2: 326 (1932); Dyer in Fl. Pl. S.Afr. 20: t. 777 (1940); Codd, Trees and Shrubs Krug. Nat. Park, 66, t.63 (1951). Var. *pubescens* Burtt Davy, l.c., xxx, 326 (1932).

S. rogersii Burtt Davy, l.c., xxx, 326 (1932).

S. semireducta Merxm. in Mitt. Bot. Munchen, 6: 199 (1953).

FIG. 6.

Tree up to 16 m. high; trunk up to 45 cm. in diameter; branchlets glabrous to tomentulose; bark rough, reddish brown. *Leaves* paripinnate, 6–16 cm. long and 5–8 cm. broad, glabrous or pubescent; stipules ovate, acuminate, 4–5 mm. long, caducous; petiole 5–25 mm. long; rhachis slightly channelled, often narrowly winged, especially towards the apex; leaflets 4–7 pairs, opposite or subopposite, sessile or with petiolules up to 2 mm. long, elliptic, oblong, ovate-oblong, ovate or obovate, 2·5–8·5 cm. long and 1·2–4 cm. broad, obtuse or rounded at the base, oblique, often with a gibbosity near the base, rounded at the apex, rarely mucronate, the upper leaflets the largest. *Inflorescence* a congested panicle, subglobose, 6–13 cm. in diameter, usually cauliflorous on older branches, occasionally borne terminally; inflorescence branches woody, abbreviated, glabrescent or tomentulose. *Bracts* ovate, 6 mm. long and 4 mm. wide, early caducous. *Flowers* deep red, pedicellate; pedicels 5–11 mm. long, glabrous or pubescent. *Calyx* deep red, leathery; tube obconical to subcampanulate, glabrous or sparingly pubescent, 3–5 mm. long; lobes 4, subequal, ovate to elliptic, 8–12 mm. long and 4–6 mm. broad, concave, the largest often emarginate. *Corolla* reduced to 5 linear filaments 2–6 mm. long, or 1–4 petals developing per flower, in which case petals red, spatulate to oblanceolate, clawed, 1·3–1·8 cm. long and 3–6 mm. broad. *Stamens* 10, connate at the base for 1·5–3·5 mm., forming a staminal tube which is entire, or split at one side; filaments linear, red, 1·8–2 cm. long, exceeding the calyx by 8–10 mm.; anthers elliptic, 2–2·5 mm.. long. *Ovary* oblong, compressed, 4–6 mm. long and 2 mm. broad, tuberculate along the margins, stipitate; stipe 4 mm. long, straight, adnate to one side of the calyx tube; style terete, 9–11 mm. long; stigma capitate. *Pod* as in generic description, 5–11 cm. long and 3·5–4 cm. broad. *Seeds* ovoid or oblique, flattened, 10–14 mm. long, with a large, compressed, yellow aril.

TYPE.—Gueinzius 33, Port Natal, at the Stockholm Natural History Museum Herbarium. Types of synonyms: var. *pubescens* Burtt Davy, Junod 635, Shilouvane, Transvaal; *S. rogersii* Burtt Davy, Rogers 21246, Waterpoort, Soutpansberg District; *S. semireducta* Merxm., syntypes, Dehn 42, Rusape, and Wild in Salisb. Hb. 40239, Rusape, S. Rhodesia.

SOUTHERN RHODESIA.—Salisbury: *Brain* 9503; *Eyles* 844; Twentydales, *Wild* 4122. Umtali: *Chase* 1602.

MOCAMBIQUE.—Maputo: *Gomes e Sousa* 3854; near Salamanga, *Hornby and Pedro* 19.

TRANSVAAL.—Soutpansberg: Waterpoort, *Rogers* 21246 (isotype of *S. rogersii*, PRE); *Smuts and Gillett* 3149; *Pole Evans* H18282; Smitsdrift, *Burtt Davy* 1697; Wylliespoort, *von Wolff* in T.M. 34861; *Codd* 4443, 4444; *Erens* s.n.; *Repton* 689; 28 miles west of Louis Trichardt, *Codd* 4442; Soutpan, *Galpin* 15143; Dongola area, *Codd* 4332a, 4453; Punda Maria area, *Rowland Jones* 23. Pietersburg: Blauwberg, Leipzig Mission, *Leipoldt* 2; *van Dam* in T.M. 23998; *Tscheuschner* in T.M. 29521; Munnik, *van Rensburg* s.n.; near Boyne, *Gerstner* 5376; Chuniespoort, *Obermeyer* in T.M. 34676, 34677; *Pole Evans* H19450; *Repton* 451. Letaba: Shilouvane, *Junod* 635 (isotype of var. *pubescens*, PRE); Tzaneen, *Pole Evans* H15819; *Altenroxel* in Hb. Burtt Davy H3065; *Charter* in Hb. Burtt Davy H3182; between Munnik and Duivelskloof, *Mogg* in Hb. Burtt Davy H10684; near Leydsdorp, *Dist. Forest Off.* LD5; *Codd* 1672. Waterberg: 25 miles N.W. of Vaalwater, *Smuts* 351; near Hermanusdoorns, *Codd* 1005, 4426. Potgietersrus: *Leendertz* 1249; Pruizen, *Burtt Davy* 2218; Pyramid Estate, *Galpin* 9135. Lydenburg: Excelsior, *Keet* 1110; Sekukuniland, Schoonoord, *Barnard* 115; *van Warmelo* 12; Lulu Mts., *Mogg* 16975; 10 miles S.W. of Penge Mine, *Codd* 6695. Pilgrim's Rest: Bushbuckridge, *Pritchard* 43. Nelspruit: Kruger National Park, near Skukuza, *Letty* 96; *Codd* 4386; 18 miles N. of Malelane, *Codd* 4375; Numbi, *van der Schyff* 63; Crocodile Bridge, *van der Schyff* 3893. Barberton: *Thorncroft* 3010; Hyslops Creek, *Thorncroft* 727 (NH); Lampogwane River, *Galpin* 653; Malelane, *Pole Evans* H15767; Louws Creek, *Wager* in T.M. 22442; Kaapmuiden, *Prosser*; Greenheart, *Oranje* in Hb. Burtt Davy 1124.

SWAZILAND.—Near Mbabane, *Rodin* 4534; between Bremersdorp and Stegi, *Miller* S/69; Lebombos, *Hornby* 2832.

NATAL.—Zululand: *Watt and Brandwyk* 1004; *Curson* s.n. Ubombo: near Mkuzi, *Galpin* 13342; s.n. (BOL); Utrecht: *Thode* A1287. Estcourt: *West* 324. Msinga: Fabene Halt, *C. A. Smith* s.n. Hlabisa: Hluhluwe Game Reserve, *Ward* 1499 (NH). Lower Umfolosi: Umhlatuzi, *Lawn* 508 (NH). Mapumulo: Darnall, *Schmidt* 55, NH37707 (NH). Durban: *Gueinzius* in SAM 15632; *Medley Wood* 9943; *MacOwan* in Hb. Bolus 1106; *Rogers* 1457; Inanda, *Medley Wood* 1367. Umzinto: Dumisa, *Rudatis* 686; Umkomaas River, *Allan* in Hb. Norm. 70; *Lansdell* in NH 37519. Port Shepstone: Lower Umzimkulu, *Medley Wood* 9575 (NH). No locality: *Flanagan* s.n.; *Sanderson* s.n.

CAPE.—Tabankulu: near Welsh Bridge, *Story* 4211; *Acocks* 13844. Umtata: Commonage, *Miller* B/95. Ngqeleni: Buntingville, *Conservator of Forests* 2058.

Of the four species recognised in southern Africa, *S. brachypetala* has the widest distribution, occurring in dry savannah and scrub forest in Southern Rhodesia, Mocambique, Transvaal, Swaziland, Natal and extending as far south as Umtata and Ngqeleni in the eastern Cape Province. As here envisaged, the species exhibits a certain amount of variation in characters such as pubescence, number and size of leaflets, and degree of suppression of the petals. Plants from the extremes of the distribution range may give the impression of being distinct, but an examination of ample material shows a series of intermediates, making the separation of even varieties of doubtful value.

Of the above variable characters, pubescence has the least significance, showing complete gradation from a persistent tomentum to a practically glabrous condition. Burtt Davy's var. *pubescens*, which is equal to typical *S. brachypetala* in every other respect, is therefore not upheld.

S. rogersii Burtt Davy, based on Rogers 21246 from Waterpoort in the Soutpansberg, was separated mainly on the grounds that two or three normal petals develop in each flower while, in typical *S. brachypetala*, the petals are all reduced to linear filaments. In all other respects, the two species are practically identical. The significance of the petal character is a problem that has been given particularly careful attention both in the field and in the herbarium. In the first place, the suppression of all petals is not invariably complete even in typical *S. brachypetala*, as will be seen from the description given by Wood (Natal Plants, 4: 390) and from reference to Table I. Further evidence bearing on the question was gathered in the Soutpansberg, the type area of *S. rogersii*. Here most of the trees examined showed the development of one to three normal petals per flower but, growing among these trees, and indistinguishable from them, are trees whose flowers have all the petals suppressed as in typical *S. brachypetala*. The reasons for the suppression or non-suppression of petals on adjacent and otherwise identical trees are not known, but the character appears to be constant for a particular tree. Another fact emerging from this study is that the tendency to produce normal petals becomes more marked toward the northern limits of the species. This is indicated by Table I which summarises the examination of 54 herbarium specimens.

TABLE I.

Relation between Geographical Distribution of *Schotia brachypetala* and number of Normal Petals per Flower.

Region.	Number of Specimens Examined.	Number of Normal Petals per Flower.		
		0.	1.	2–4.
Eastern Cape	3	2	1	—
Natal	15	14	1	—
Central and Eastern Transvaal	21	19	2	1
Soutpansberg and Blauwberg	12	2	1	9
Southern Rhodesia	3	—	—	3

It is of interest to note that no case has yet been found of a flower with 5 normal petals. On the basis of the petal character alone, it is evident that a separate species or even variety cannot be upheld, and the conclusion is unavoidable that *S. rogersii* must be relegated as a synonym.

The status of *S. semireducta* Merxm. is not as easy to decide. Most of the specimens seen from Southern Rhodesia show a combination of deviations from typical *S. brachypetala*. There is the development of 2 to 4 normal petals per flower and, in addition, most specimens differ in having up to six or, rarely, seven pairs of leaflets, which are often more markedly and persistently tomentose.

In describing his species, Merxmuller contrasts it with *S. brachypetala*, *S. brachypetala* var. *pubescens* and *S. transvaalensis*, but he fails to consider *S. rogersii*. Thus the character which he stresses most, namely, the development of two or three petals per flower, has already been used as a distinguishing feature for the separation of a species and, on the basis of the findings here reported, the character must be considered to have practically no taxonomic value in this particular group. The remaining characters to consider in evaluating the status of *S. semireducta* are number

of leaflets and pubescence. Of these, pubescence has already been shown to have the least meaning and, in fact, one specimen from Southern Rhodesia, Brain 9503, has leaves and twigs that are glabrous, though the inflorescence branches are pubescent. Regarding number of leaflets, typical *S. brachypetala* has almost consistently 4 pairs or, rarely, 5 pairs. In the Transvaal, some specimens have up to 6 pairs, though this is exceptional and the usual number is 4 pairs. In Southern Rhodesia the specimens appear normally to have 6 pairs, rarely 5 or 7 pairs. Thus there is a progressive change from south to north and the three main characters deviating from typical *S. brachypetala* are found in *S. semireducta*, though the combination is not yet constant. This is, no doubt, an evolutionary trend and, on available evidence, it is considered that the differences are not sufficient to sustain *S. semireducta* as distinct.

S. brachypetala is an attractive, round-topped tree usually about 25 to 35 feet high, though known to grow up to 45 or 50 feet. As pointed out by Wild, Rhod. Agr. Journ. 49: 3–9 (1952), it is often associated with termite mounds while, in the Lowveld, it is one of the species found on river banks. It is practically evergreen, the leaves usually being shed for a short while immediately before the clusters of red flowers appear in October.

5. **S. latifolia** *Jacq. X* **S. afra** (*L.*) *Bodin*, **Form A.**
S. stipulata Ait., Hort. Kew. ed. II. 3: 33 (1811); DC., Prod. 2: 508 (1825); E. & Z., Enum. Pl. Afr. 261 (1836).
S. speciosa var. *ovalifolia* Harv. in Fl. Cap. 2: 274 (1861).

Figs. 9 and 11.

Shrub or small tree. *Leaflets* 3–5 pairs, 1·7–4·2 cm. long and 1·2–2·3 cm. broad, sessile, elliptic-oblong to obovate, oblique, base rounded to cuneate, apex obtuse or acute, often mucronate. *Inflorescence* terminal, more or less lax; inflorescence branches semi-woody, patent. *Pedicels* 1–5 mm. long. *Calyx* leathery; tube 3–4 mm. long; lobes 8–9 mm. long and 5–6 mm. broad, concave. *Corolla* reddish; petals 5, 12–13 mm. long and 3–4 mm. broad. *Stamens* 10, free to the base. *Ovary* oblong, compressed, 4–5 mm. long, stipitate. *Pod* as in generic description. *Seeds* ovoid, flattened, pale brown, with a yellow aril.

Cape.—Uitenhage (?): " Between Winterhoeksberge and Zwartberge ", *Ecklon and Zeyher* 1700 (SAM); " Zwartkopsriver near Addo ", *Zeyher* 2446 (SAM). Port Elizabeth: Redhouse (on Swartkops River), *Paterson* 662 (GRA).

The description given above is based mainly on Paterson 662, which is complete with leaves, flowers and fruits. Superficially, this specimen looks like *S. latifolia*, with its 3–5 pairs of leaflets which vary considerably in size, its terminal, relatively lax inflorescence and arillate seeds. However, it also possesses characters which normally belong to *S. afra*, namely, pedicels 4–5 mm. long, calyx tube 4 mm. long and stamens free to the base. There is thus evidence to suggest that it is of hybrid origin.

Two further specimens in the South African Museum Herbarium show a resemblance to Paterson 662. These are Ecklon and Zeyher 1700 and Zeyher 2446 which are remarkably similar to one another and, in spite of the different localities given, lead to the suspicion that they may be from the same gathering. They consist of two twigs and one twig, respectively, having immature inflorescences which are terminally placed and relatively lax. The leaflets are in 3–5 pairs, intermediate in size between *S. afra* and *S. latifolia* while, as far as can be determined from the flower buds, the stamens appear to be free.

It seems that the name *S. stipulata* Ait. is applicable to this small group of specimens intermediate between *S. afra* and *S. latifolia*. This supposition is based on information supplied by Mr. D. J. B. Killick, our Liaison Officer at Kew, who was asked for a description of the type of Aiton's species, if it could be found. Aiton based his species, published in 1811, on a plant cultivated at Kew and said to have been grown from seed supplied by Francis Masson in 1794. The only specimen found that comes close to Aiton's description is one in the British Museum, labelled " Hb. Kew 1808 " with no further details. Two names are on the sheet: " S. macrophylla " and " S. stipulata ". It has 4 or 5 pairs of large leaflets, 2·5–3·0 cm. long and 1·2–1·6 cm. broad, conspicuously mucronate, while the rhachis is distinctly winged (both these conditions are found in the juvenile state of all *Schotia* species). The pedicels are short, about 1 mm. in length, but the flowers are larger than those of *S. latifolia* and the stamens are free to the base. The plant has conspicuous stipules 7 mm. long and 4 mm. wide but, as very few herbarium specimens have stipules, the significance of this character cannot be judged. It may be inferred that this is probably Aiton's type.

Masson travelled with Thunberg as far east as the Uitenhage District and was at the Swartkops River, more or less the locality of Zeyher 2446 and Paterson 662, on 15th December, 1773 (Phil. Trans. Roy. Soc. Lond., 66: 297, 1776). It would have been useful corroborative evidence if Masson had made a herbarium specimen corresponding to the seeds supplied to Kew, but no such specimen has been found. Three *Schotia* specimens collected by Masson are at the British Museum; two of these are clearly *S. afra* while the third, endorsed in pencil " S. macrophylla " is equal in every respect to *S. latifolia*.

In Flora Capensis, Harvey reduced *S. stipulata* Ait. to *S. speciosa* var. *ovalifolia* citing, in addition, " E. & Z. 261 ". No *Schotia* specimen with this number has been found and it is thought that Harvey cited, by mistake, the page number of Ecklon and Zeyher's Enumeratio because, on page 261 of that work, is listed " 1700. *S. stipulata* Ait.".

To give this small group of intermediate specimens specific rank is clearly not justified. To place them as a variety of either *S. afra* or *S. latifolia* would be equally illogical as it would mean an undesirable widening of the conception of one of these species. It is therefore preferred to keep them apart as an " intermediate " or " hybrid " form, as has also been done with the specimens listed under the following heading.

6. **S. latifolia** *Jacq.* *X* **S. afra** (*L.*) *Bodin*, **Form B.**

FIG. 10.

Shrub or small tree. *Leaflets* 4–10 pairs, 0·9–2·5 cm. long and 4–10 mm. broad, oblong to elliptic-oblong, rounded at the base, often oblique, usually obtuse at the apex, sometimes mucronate. *Inflorescence* usually on abbreviated side branchlets, more or less glomerate; inflorescence branches abbreviated, semi-woody. *Pedicels* 3–3·5 mm. long. *Calyx* leathery; tube obconical, 3–4 mm. long; lobes 7–9 mm. long and 5–7 mm. broad, concave. *Corolla* pink to reddish; petals 5, 13–17 mm. long and 3–4·5 mm. broad. *Stamens* 10, united at the base for 1–3 mm. with the sheath split open on one side. *Ovary* oblong, compressed, 4–5 mm. long, stipitate. *Pod* as in generic description. *Seeds* ovoid, flattened, pale brown, with a small or large aril.

CAPE.—East London: Amabele Siding, *Flanagan* s.n.; Bonza Bay, *East London Museum* in NBG. Bathurst: Lower Kariega Valley, *Acocks* 13280; Port Alfred, *R. Verdoorn* 10. Alexandria: Between Alexandria and Grahamstown, *Burtt Davy* 12130.

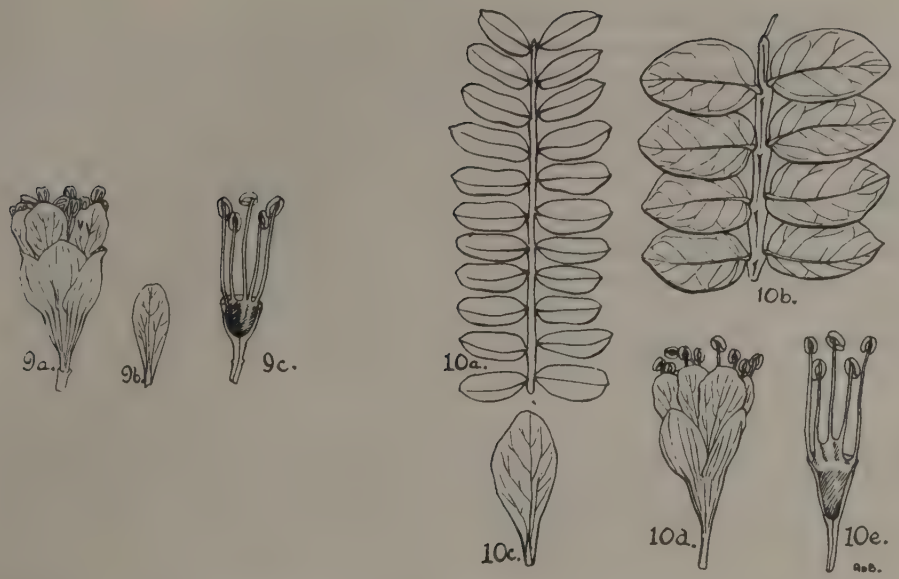


FIG. 9.—Hybrid Form A, a, flower; b, petal; c, longitudinal section. FIG. 10.—Hybrid Form B, a and b, leaves; c, petal; d, flower; e, longitudinal section. All life size.

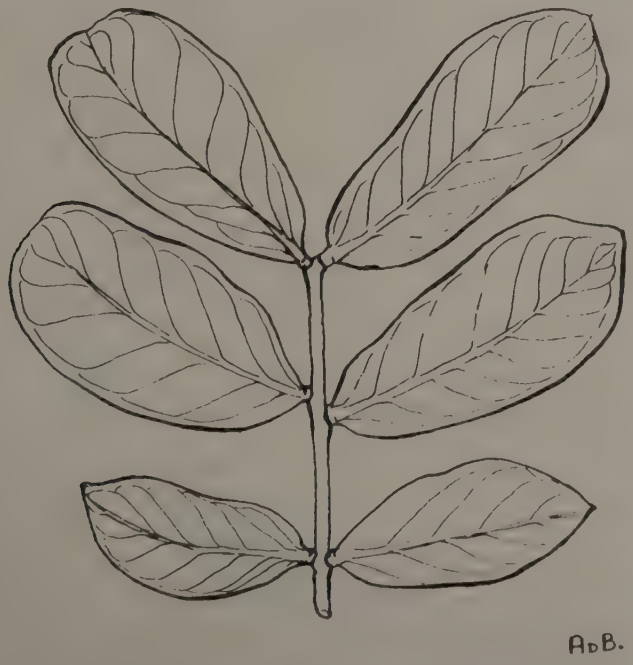


FIG. 11.—Hybrid Form A, leaf, life size.

Of the above specimens, Flanagan s.n. is fruiting, while the remainder are in flower. The floral characters show a fairly uniform pattern, resembling *S. afra* in their usually glomerate inflorescences, pedicel length and length of the calyx tube but, like *S. latifolia*, the stamens are united at the base. The leaflets show more variation though, in general, they are fewer and larger than in *S. afra*, being intermediate in character between this species and *S. latifolia*. The Flanagan specimen has tomentulose twigs and leaflets, and seeds with large arils as in *S. latifolia*, while the Acocks specimen has seeds with much smaller arils. One gains the impression that these characters could be derived through hybridisation between *S. latifolia* and *S. afra*, though there is no direct evidence to support this view. As in the case of the specimens considered under the previous heading, no advantage can be seen, at this stage, in giving these few specimens varietal or specific rank. It is, perhaps, significant that they occur in the area where both *S. latifolia* and *S. afra* are found.

Further field work is desirable in order to form a better idea of the distribution and frequency of these aberrant forms, but the fact that they are not well represented in herbaria suggests that they are relatively rare. A cyto-genetical study of seeds from such plants may also help to decide whether they are really of hybrid origin and thus throw light on their taxonomic position.

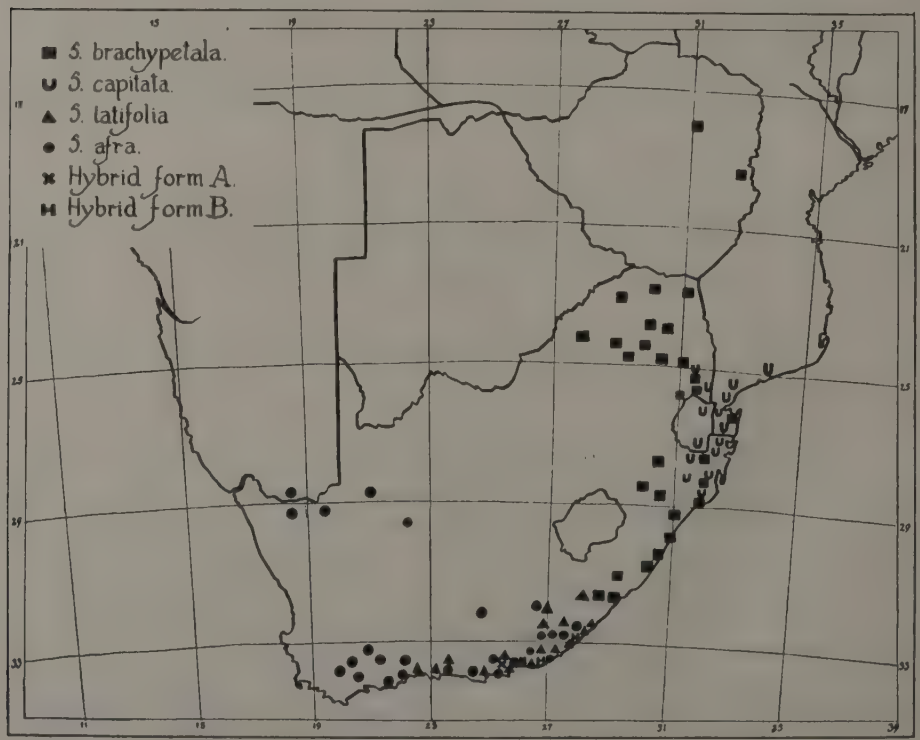


FIG. 12.—Map showing distribution of *Schotia* species in southern Africa.

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New and Interesting Records of South African Flowering Plants.

By

E. E. A. Archibald, L. E. Codd, R. A. Dyer,

A. D. J. Meeuse and D. van Druten.

ACANTHACEAE.

Sclerochiton ilicifolius *A. Meeuse*, sp. nov.

Frutex multiramosus, 1–2 m., interdum usque ad 3 m., altus. *Rami ramulisque* teretes, cortice griseo longitudinaliter pauceque rugoso obtecti; ramuli ulteriores subtereti vel subquadrangulares, laeves, puberuli. *Folia* parva, rigida, tenuiter coriacea, lucida, subtus pallidiora, oblonga, elliptica vel ovato-elliptica, acuta vel acuminata, pungentia, plerumque pauce spinoso-dentata, interdum parce integra, supra tota subtus ad costam puberula, 1–2 cm. longa et 0·6–1 cm. lata; petioli puberuli, 0–3 mm. longi. *Inflorescentiae* terminales, spicatae, pauciflorae, densae; bracteae bracteolaeque ellipticae, pungentes, integrae vel interdum 1–2 spinas laterales gerentes, dense glanduloso-pubescentes. *Calyx* extus dense glanduloso-pubescens; sepala 5, inaequalia, pungentia, posterius majus, lineari-oblongum, c. 3 cm. longum, plerumque bicuspidatum; laterales et anteriora lanceolata, longe attenuata, acutissima. *Corolla* 1-labiata, alba; lobi supra dilutissime violacei, c. 34 mm. longi; tubus brevis, ad apicem contractus, in fauce dense barbatus; limbus cuneato-oblongus, sparse pubescens et intus in lineis longitudinalibus 2 densissime sericeo-villosus, ad apicem 5-lobatis lobis 5 subaequalibus oblongis apice rotundatis leviter deflexis et concavis c. 6 mm. longis. *Stamina* in fauce inserta, exserta, subaequalia; filamenta arcuata, purpureo-brunnescentia, ad basin pilosa; antherae 1-loculatae, depresse semiorbiculares, lanatae; connectivum ad apicem non productum. *Pollen* ut in typo, subglobosum. *Ovarium* cylindrico-fusiforme, glabrum, 4-ovulatum; discus flavus, annuliformis; stylus arcuatus, subulato-filiformis; stigma subnullum minute 2-lobatum. *Capsula* oblonga vel ellipsoidea, glabra, lignosa, 15–20 mm. longa, 2–4-sperma. *Semina* subquadrata vel trapezoidea, magis compressa, brunnea, glabra, rugulosa, 5–6 mm. longa.

TRANSVAAL.—Warm Baths district, hills west of Warm Baths: *Mogg* s.n.; Waterberg district, between Hermanusdoorns and Elmeston, *Meeuse* 9655 (type) in National Herbarium, Pretoria; *Meeuse* 9657, *Codd* 4011; Soutpansberg district, Schlesinger's Sawmill W. of Louis Trichardt, *Gerstner* 5929, 1946 (all in PRE; isotypes and duplicates of *Meeuse* 9657 distributed to BM, BOL, BR, COI, EA, K, L, P, SRGH, and elsewhere).

Description.—Shrub, erect or sometimes somewhat straggly, much branched from the base and throughout, 1–2 m., occasionally up to 3 m. high. *Main stems and branches* woody, up to about 2 cm. in diam., covered with a greyish longitudinally wrinkled bark; the branches usually bearing numerous short leafy lateral shoots; ultimate twigs terete or faintly quadrangular, firm, yellowish or pale buff to pale yellowish green, smooth, densely puberulous, rather densely leafy mainly towards the apex and many terminating in an inflorescence. *Innovations* glandular-pubescent. *Leaves* resembling

those of the European holly (*Ilex aquifolium* L.) in shape and texture but smaller, usually oblong or elliptic varying to somewhat ovate or obovate, rather dark green and somewhat shiny above, pale green and duller below, rigid, thinly coriaceous, somewhat tapering to cuneate at the base, acute to acuminate and spine-tipped at the apex, 1–2·5 cm. long and 0·6–1 cm. wide; the margin slightly thickened to subrevolute, usually with 1–3 spine-tipped triangular teeth on either side, rarely some leaves entire; upper surface glabrous or somewhat puberulous at the base in mature leaves; lower surface glabrous, marked with minute cystoliths, puberulous on the midrib; midrib faintly impressed above, slightly prominent below; lateral nerves (3–)4–7(–8) on either side, hardly impressed above, in fresh leaves impressed but in dried specimens prominent on lower surface, emerging at an angle of about 45°, rather straight, mostly reaching the margin and some of them ending in the thin spine of a lateral tooth of the leaf-blade; tertiary nervation inconspicuous; petioles 0–3 mm. long, somewhat depressed above, convex below, puberulous. *Inflorescences* terminal on the flowering branches, spicate, ovoid or shortly cylindric, 4–6 flowered; upper leaves gradually changing into a few lower sterile bracts; sterile and fertile bracts entire or occasionally with a lateral spine on one or both sides, ovate or ovate-elliptic to somewhat obovate-elliptic, slightly concave, acuminate and spine-tipped, in colour and texture resembling the leaves but slightly paler and densely covered with fine gland-tipped patent hairs intermixed with shorter non-glandular hairs on outer (lower) side, on their margins and on their tips inside, and on lower half of inner (upper) surface with some short adpressed hairs, 20–25 mm. long and about 10 mm. wide; main nerve ending in the terminal spine and on either side with 1–3 nerves arising from the base and running more or less parallel with the main nerve, all reaching the margin in upper half of the bract; bracteoles 2, very similar to the bracts but slightly narrower, 7–8 mm. wide. *Calyx* green, unequally 5-lobed, the lobes ending in soft spines, densely glandular, pubescent outside and near the tips inside, upper (posticous) lobe the largest-linear-oblong, acute to acuminate and undivided, or more or less deeply bicuspidate with acute, spine-tipped cusps at the apex, about 3 cm. long and 6·5 mm. wide; 2 lateral lobes linear-lanceolate, long-tapering into a very acute apex, about 2·5 cm. long and 2–2·5 mm. wide near the base; basal (anticous) lobes linear-lanceolate, tapering into an acute apex, 26 mm. long and 3–3·5 mm. wide near the base. *Corolla* white tinged with very pale mauve on the inside of the lobes and more creamy-white on lower side of lip, 34 mm. long, tube short, smooth, shiny, glabrous outside, cylindric-campanulate, thence widening into an oblique throat which is partly covered with soft white adpressed hairs outside, mainly on upper side, and densely bearded within; limb large, 1-lipped, cuneate-oblong, sub-equally 5-lobed, about 25 mm. long and 21 mm. wide near the apex, nearly glabrous below, with a few short hairs and two very densely white-silky palatal ridges extending from the throat to the corolla-lobes on upper (inner) side; the lobes oblong, rounded at the apex. *Stamens* 4, subequal, inserted in the throat in two pairs, filaments brown, densely bearded at the base and 2 upper (posticous) ones thinly hairy throughout, about 15 mm. long; anthers 1-thecous, depressed semi-orbicular, completely attached to the filament, yellowish brown, those of each pair more or less connate by woolly hairs; connective greenish. Pollen subglobose, smooth, with three longitudinal very shallow chinks not reaching the poles. *Pistil* about 19 mm. long; disc annular, bright yellow; ovary ovoid-oblong, rather dark green, glabrous, 4-ovuled; style subulate-filiform, rather stout, slightly upcurved in basal part, thence faintly arcuate-recurved, very pale mauvish green with a line of white hairs near its base on lower (abaxial) side otherwise glabrous; stigma truncate, faintly bilobed. *Capsule* oblong or ovoid-oblong, somewhat laterally compressed, tapering to apiculate at the apex, turning a shiny brown when ripe, woody, 15–20 mm. long. *Seeds* 2–4, much compressed, subquadrate or trapezoid often more or less distinctly oblique or produced on one side at the base, brown when ripe, finely rugose, without hygroscopic hairs, 5–6 mm. long.

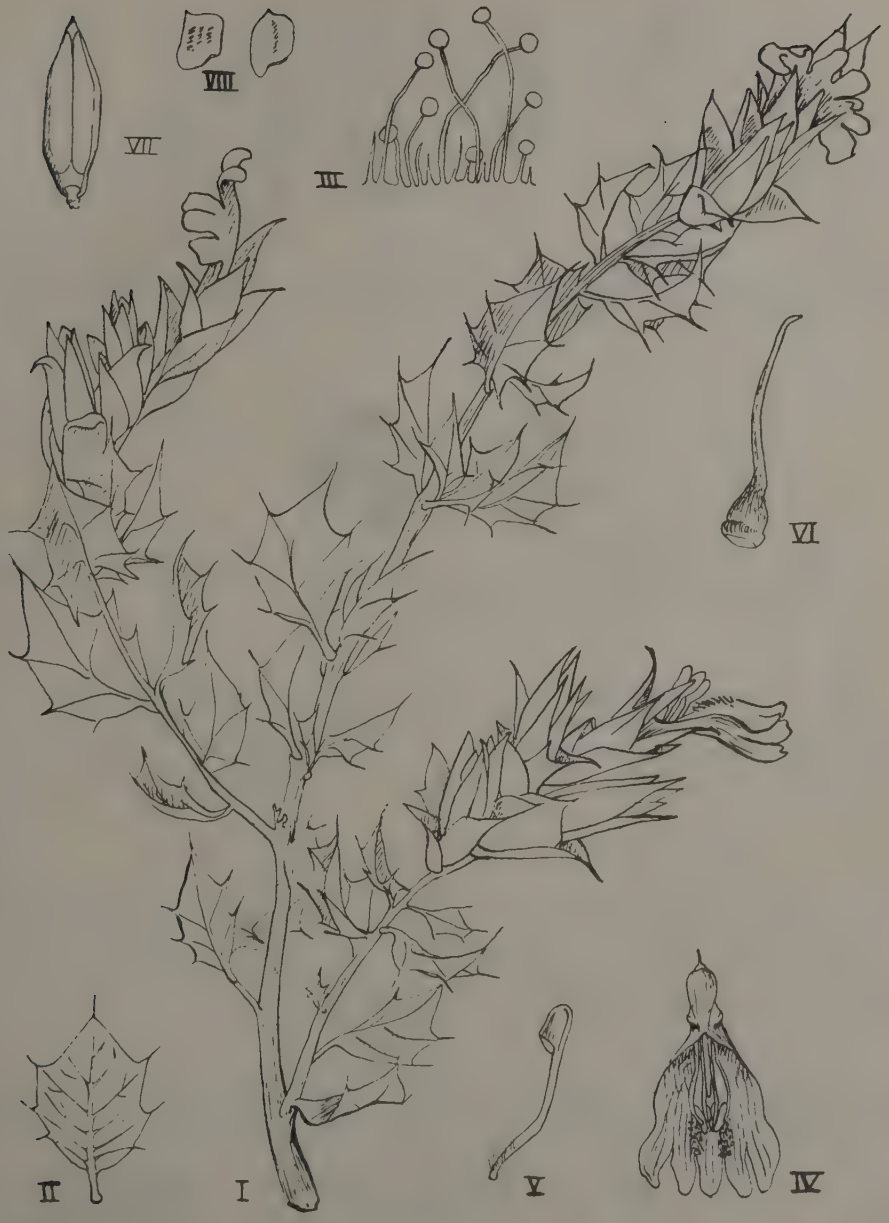

FIG. 1.—*Sclerochiton ilicifolius* flowering branch; 2, leaf; 3, pubescence of floral leaves and calyx, showing gland-tipped hairs and short non-glandular ones; 4, corolla, seen from above; 5, stamen, seen from the side; 6, pistil; 7, capsule and 8, seeds. 1, 2 and 4: natural size. 5, 7 and 8: × 1·5, 3, × 100 and 6, × 2.

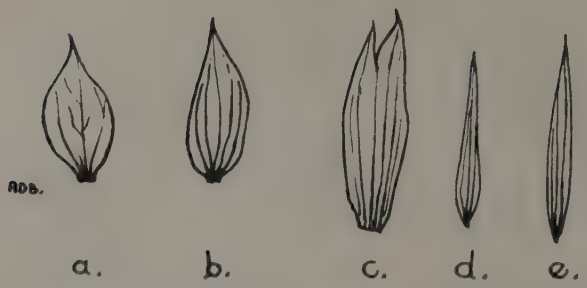

FIG. 2.—*a* bract, *b* bracteole, *c* posticous calyx-segment, *d* lateral calyx-segment, *e* one of the anticous calyx-segments, natural size.

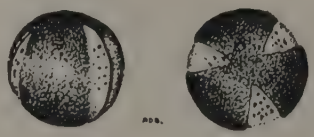

FIG. 3.—Pollen grain of *Sclerochiton ilicifolius* seen from the aequatorial side (left) and from the polar side (right), appr. × 400.

NOTE.—Some flowers of the specimens collected under the number Meeuse 9655 are abnormal. They have more than 5-calyx-segments, 6–9 corolla-lobes and 5 or 6 stamens or 4 stamens and 1 or 2 sterile staminode-like structures. This is obviously a monstrosity or a teratologicum because the flowers of the Acanthaceae are generally 4- or 5-merous with 4 or 2 stamens.

Prior to this investigation the two specimens Gerstner 5929 and Codd 4011 were placed tentatively in the genus *Crossandra* and the specimen collected by Mogg in 1924 was unearthed recently in a parcel of unnamed specimens in the National Herbarium preparation room. In April, 1955, ample fresh flowering material was obtained in the Waterberg district near the site of Codd 4011 and in the beginning of June of the same year excellent fruiting material was collected in exactly the same locality.

The new species evidently belongs to the tribe Acanthoideae-Acantheae on account of the one-lipped corolla, the 4 stamens with one-loculed anthers and the pollen morphology and was compared with the genera belonging to this tribe.

It differs from *Acanthus* in its habit, in the 5-partite calyx (4-partite in *Acanthus*), in the subequally 5-lobed corolla (unequally 3- or 5-lobed in *Acanthus*) and in the globose (not ellipsoid) pollen. It differs from *Blepharis* and *Acanthopsis* in the 5-partite calyx, the sub-equally 5-lobed corolla, the pollen and the glabrous seeds (the seeds have hygroscopic hairs in the other two genera); in addition, *Blepharis* has the filaments of the anticous segments produced behind the anthers and the ovary has 2 hollows filled with glands.

It differs from *Crossandra*, among other things, in the short corolla-tube (long in *Crossandra*), in the colour of the corolla (red, orange or yellow in *Crossandra*), in the exserted stamens (included in *Crossandra*), in the shape of the pollen and in the glabrous seeds (those of *Crossandra* are covered with hygroscopic hairs or with scales fringed with hygroscopic hairs). It was evident that the plant agreed with the genus *Sclerochiton* (including *Pseudoblepharis*) in all essential characters such as the shape of the inflorescence, the 5-partite calyx, the subequally 5-lobed corolla, the morphology of the stamens and pollen, the stigma and the glabrous seeds. It differs from all previously described species of *Sclerochiton* in a few less important, mainly vegetative characters such as the spine-toothed and pungent leaves, the pungent floral leaves and calyx-segments and the glandular pubescence on the floral leaves and calyx. The leaves in all other species are entire, although those of the type species, *Sclerochiton harveyanus* Nees, are sometimes faintly crenate or serrate. Pungent floral leaves and calyx segments, and a glandular pubescence were also not previously recorded for this genus. These differences do not, however, warrant separate generic status. All descriptions of species of *Sclerochiton*, a genus restricted to Africa and Madagascar, were compared and not one is even remotely suggestive of the species discussed here. No other genus proposed in the tribe Acantheae from Africa or Madagascar was encountered that could possibly fit our plant, so that it is most unlikely that it was ever described before. A specimen was kindly compared by Dr. H. Wild of the Government Herbarium, Salisbury, Southern Rhodesia, who reported that he did not know the plant and that it was not represented in the Salisbury herbarium. This would indicate that the plant does not occur in tropical Africa and is restricted to the Transvaal. Its known distribution in the Transvaal is very scattered, and although the plant, even when not in flower, is rather remarkable with its bright green foliage consisting of small spine-toothed leaves and would attract the attention of botanists on the solid quartzite outcrops forming its natural habitat, it must be a rare or very local species. On the other hand it can be quite frequent locally. The leaves, though smaller, are strongly reminiscent of those of the European holly, *Ilex aquifolium* L., and the specific epithet "*ilicifolius*" is considered to be appropriate as it not only expresses this resemblance but also emphasizes one of the main differences between the new species proposed here and all other species of *Sclerochiton*.

ANACARDIACEAE.

Rhus batophylla *L. E. Codd*, sp. nov., affinis *R. tomentosae* L. foliolae marginibus in toto serrato-dentatis, ramulis infra foliisque dense lanatis, inflorescentiis longioribus et angustioribus differt.

Frutex 1–1·5 m. altus e basi profunde ramosus. *Rami* ascendentes, sparse ramosi, superne dense lanati. *Folia* petiolata, petiolis 1–2 cm. longis, supra leviter canaliculatis, dense lanatis; foliolae sessiles, ellipticae, ovatae vel obovatae, coriaceae, serrato-dentatae, dentibus triangularibus mucronatis 2–3 mm. longis basi 3–4 mm. latis, infra dense tomentosae, supra glabrescentes; foliola terminalis 4·5–6·5 cm. longa, 2·3–3 cm. lata, foliolae laterales 2·5–3·8 cm. longae, 1·5–2·6 cm. latae. *Paniculae* terminales vel non-nunquam axillares, angustae, 8–18 cm. longae, 2–4 cm. latae, dense lanatae. *Flores* aggregati, pedicellis 0·5–1 mm. longis; sepala triangularia, plusminusve 0·7 mm. longa; petala glabra, 1–1·5 mm. longa, in floribus masculis staminibus 5 brevioribus. *Drupae* compressae, 5–6 mm. latae, glabrae, rubrae.

Plate No. I.

Transvaal.—Lydenburg District, Sekukuniland: *Mogg* s.n.; Mooihoek Chrome Mine, 1½ miles west of Driehoek, *Codd and Dyer* 7699, female (*type*), 7700, male; *Story* 4051; 5 miles south-east of Steelpoort Post Office, *Codd* 6700.

Shrub 1–1·5 m. high, branching freely from the base. *Branches* stiff, ascending, sparingly branched, unarmed, the younger branches densely lanate, with reddish-brown bark under the tomentum. *Leaves* trifoliolate, petiolate; petioles 1–2 cm. long, slightly channelled on the upper surface, not winged, densely lanate; leaflets sessile, elliptic to ovate or obovate, obtuse to cuneate at the base, acute, coriaceous, tending to fold along the midrib, regularly and conspicuously serrate-dentate from base to apex, the teeth broadly triangular, mucronate, 2–3 mm. long and 3–4 mm. broad at the base; under surface of leaf covered with dense, white to cream coloured, woolly, persistent tomentum, the upper surface covered thinly in the young stage, becoming glabrescent with age; secondary nerves prominent on under surface; tertiary nerves reticulate above, obscured by the tomentum below in the young stage but becoming conspicuous with age; terminal leaflet 4·5–6·5 cm. long and 2·3–3 cm. broad with 8–12 pairs of secondary nerves; lateral leaflets 2·5–3·8 cm. long and 1·5–2·6 cm. broad with 6–9 pairs of secondary nerves. *Inflorescence* terminal and also axillary in the upper leaf axils, forming a narrow, elongate panicle 8–18 cm. long and 2–4 cm. wide, the main axis and branchlets densely lanate tomentose. *Flowers* borne in clusters; pedicels 0·5–1 mm. long. *Calyx* pubescent, 5-partite, segments triangular, less than 1 mm. long. *Corolla* glabrous, yellow-green; petals 5, 1–1·5 mm. long. *Male flowers* with 5 stamens, shorter than the petals; disc present; ovary absent. *Female flowers* usually with 5 staminodes; ovary flattened. *Drupe* glabrous, flattened, 5–6 mm. long, red and wrinkled when mature.

Rhus batophylla is a very distinctive shrub showing no close affinity to any known species. The dense, woolly tomentum persisting on the branchlets and on the underside of the leaves suggests that its relationship is to Schonland's section *Tomentosa*, but it is readily distinguished from any species in this group and, in fact, from any other South African species, by the margins of the leaflets being regularly serrate-dentate from base to apex, and in the long, sparingly branched, narrow inflorescence. Specimens were sent to our liaison officer at the Kew Herbarium, where they were unmatched.

With its discolorous, markedly serrate leaflets and its habit of branching near ground level, producing numerous stiff, ascending branches 3 to 4 feet high, the plants bear a striking resemblance to a species of *Rubus*, and the specific epithet is derived from the Greek *batos*, bramble. The plants tend to grow communally in the dry bushveld to the north and west of Burgersfort, in eastern Sekukuniland, where the altitude is about 3,000 feet. The species has not been recorded outside this area.

ASCLEPIADACEAE.

Brachystelma montanum, *R. A. Dyer*, sp. nov., affinis *B. crispo* Grah., sed habitu minore corollis multo minoribus interne immaculatis externe glabris differt.

Herba perennis; tuber 2–5 cm. latus, plus minusve 2 cm. altus, subglobosus vel depresso-globosus. *Caules* perennes, subterranei, solitarii vel bini, ad 5 cm. longi, caules annui 1–4, usque ad 6 cm. alti, superne ramosi. *Folia* oblonga ad linearilanceolata, basalia 1·5–2·3 cm. longa, 2–4 mm. lata, superiora breviora et angustiora obtusa ad acuta, infra et marginibus scabrida, supra tenuiter scabrida. *Flores* ad nodos plerumque 2, pedicelli graciles, 1–3·5 mm. longi, dorso pilis paucis instructi. *Corolla* usque ad 1·5 cm. longa, basi tubulosa; tubus campanulatus, usque ad 4·5 mm. longus, 4–5 mm. diametro; lobi e basi ovato-lanceolato lineares, circiter 1 cm. longi, minus 1 mm. lati, infra medium ciliati. *Coronae* lobi inferne in seriei uno confluentes, exteriores poculos V-formatos formantes, interiores supra incumbentes, partibus liberis linearibus usque ad 1 mm. longis.

Cape Province.—Wodehouse Division, northern slopes of Andriesberg, 6,000 ft. Dec. *Galpin* 6278 in National Herbarium Pretoria, type (duplicate at Kew).

Perennial herb; tuber 2–5 cm. broad and about 2 cm. thick, subglobose or depressed, with 1–2 perennial underground stems up to 5 cm. long; annual branches 1–4, up to 6 cm. tall, branched above. *Leaves* oblong to linear-oblong; basal ones 1·5–2·3 cm. long, 2–4 mm. broad and upper ones considerably reduced in size. *Flowers* usually 2 from each node; pedicels slender 1–3·5 cm. long, thinly pubescent. *Sepals* lanceolate, 3–3·5 mm. long with a few hairs on their backs. *Corolla* up to 1·5 cm. long, tubular at base; tube campanulate, up to 4·5 mm. long and 4–5 mm. diam. at the mouth; lobes linear from an ovate-lanceolate base, about 1 cm. long, less than 1 mm. broad above, ciliate below the middle. *Corona lobes* united more or less into one series about 2 mm. high; the outer lobes are like V-shaped pockets with their margins appearing as shoulders at the base of the inner lobes; inner lobes incumbent on the backs of the anthers with the free portion linear, up to 1 mm. long.

Galpin's specimen has remained unnamed since its collection in 1901. It is well known that the flowers of *Stapelieae* and of allied genera such as *Brachystelma* shrivel during drying unless particular care is taken to prevent it. In the case of *Galpin* 6278 parts of the collection have obviously contracted considerably in drying while others appear to have retained their normal size and the measurements given above were taken from these.

Brachystelma pilosum *R. A. Dyer*, sp. nov., affinis *B. galpinii* N.E. Br., sed robustior, pilis patulis hirsuta, coronae lobis exterioribus glabris, coronae lobis interioribus oblongis obtusis differt.

Herba perennis, erecta usque ad 25 cm. alta, prope basin ramosa, pilis patulis 1–1·5 mm. longis hirsuta. *Caulis* basi 4–5 mm. diametro; internodiis 2–4 cm. longis. *Folia* sessilia vel subsessilia, oblonga, 1–1·5 cm. longa, 3–5 mm. lata, marginibus satis involutis et leviter undulatis. *Flores* patentes vel suberecti, plerumque 2 ad nodos. *Sepala* lanceolata, 2–2·5 mm. longa. *Corolla* 1·6–1·8 cm. longa, parte inferiore patelliformi 1–1·5 mm. connata, lobi basi lanceolati, medio ad 0·5 mm. contracti, superne ad 1 mm. lati, apicibus connati, externe dimidio inferiore, superne tenuiter hirsuti, interiore glabri. *Corona* columnae staminalis supra basin circiter 0·75 mm. inserta; coronae lobi exteriores 1·5 mm. longi, in segmentis linearibus profunde bilobati; coronae lobi interiores oblongi, supra antheras incumbentes et leviter longiores, basin versus dorsale leviter umbonati.

Transvaal.—Potgietersrust Division; near Naboomspruit on farm Nooitgedacht in lightly wooded grassland, rare, July, *Galpin* 11573 in National Herbarium, Pretoria, type; *Crawley*, Transvaal Mus. No. 10402, at Kew and N.H.P.

Perennial herb, erect, up to about 25 cm. tall, branched from near the base. *Stem* 4–5 mm. diam. near base; branches hirsute with spreading hairs 1–1·5 mm. long; internodes 2–4 cm. long. *Leaves* sessile or subsessile, more or less oblong, 1–1·5 cm. long, 3–5 mm. broad, with the margins somewhat folded upwards and slightly undulate. *Flowers* spreading or suberect, usually 2 together at the nodes. *Sepals* lanceolate, 2–2·5 mm. long. *Corolla* 1·6–1·8 cm. long, with the basal united portion saucer-shaped, 1–1·5 mm. long; lobes united at tips with a lanceolate base and contracted to 0·5 mm. then expanded towards the tips to 1 mm. broad, hirsute on the backs in the lower half and thinly so above, glabrous on the inner surface. *Corona* arising from the staminal column about 0·75 mm. above its base; outer corona lobes about 1·5 mm. long, deeply bilobed into linear segments; inner corona lobes oblong, incumbent on the backs of the anthers and slightly exceeding them but not meeting over the centre of the staminal column, slightly thickened or humped on the backs towards the base.

In Kew Bulletin 1953 p. 358, Mr. Bullock proposes the resuscitation of the genus *Dichaelia* Harv. for the species of *Brachystelma* in which the tips of the corolla-lobes are connate. In describing *B. pilosum*, which has this character, I have followed N. E. Brown and used the generic name *Brachystelma* because I consider the observations by Brown in Fl. Cap. 4, 1: 834 (1908) are well founded and his treatment consistent with the known facts.

LILIACEAE.

Albuca crudenii, *Archibald* sp. nov., affinis *A. glandulosae*, Bak., folio uno, perianthio glabro, stigmate convexo differt.

Bulbus subglobosus, circiter 30 mm. diam., membranaceo-tunicatus. *Folium* unum, viridi-flavum, lineario-lanceolatum, planum vel paulum plicatum, usque ad 45 cm. longum, 16 mm. latum, novellum apice subulato, marginibus venisque puberulis. *Scapus* 45 cm. longus, puberulus; pedunculus 28 cm. longus, 3 mm. diam.; racemus laxus secundus; bracteae membranaceae, rubro-nervatae, deltoideae, apiculatae, 9 mm. longae, 8 mm. latae; pedicelli cernui, puberuli. *Flores* 3–10, penduli, odorati; petala exteriora glabra, patentia, aurea, medio viridi-striato, oblonga, 15 mm. longa, 6 mm. lata, apicibus haud cucullatis; petala interiora glabra, erecta, colore pallidiora quam exteriora, ovata, 12 mm. longa, 5 mm. lata, apicibus cucullatis 1 mm. longis. *Stamina* exteriora infertila, interiora fertila. *Gynoecium* glabrum; ovarium 5 mm. longum, 3 mm. diam., viride, basin versus sine scuta; stilus oblongus, 5 mm. longus, 1 mm. diam., luteus; stigma convexum, viride.

Cape Province.—Albany District: Dassieklip, October, *Archibald* 5289 in Albany Museum Herbarium (type); Alicedale, September, *Cruden* 14a in Albany Museum Herbarium.

Bulb nearly spherical, up to 30 mm. diam.; scales tunicate, outer light brown, membranous, inner white, fleshy; roots fibrous. *Leaves* usually one, only very rarely two, light yellowish-green, lax, mesophytic, linear-lanceolate, flat or slightly folded, up to 45 cm. long, 16 mm. broad, tip subulate in young leaf but withering off early, veins marked on upper and lower surfaces by fine channels, leaf margins and vein-channels each with a single row of minute, glandular, transparent, erect hairs. *Inflorescence* a lax, secund raceme up to 45 cm. long; peduncle up to 28 cm. long, 3 mm. diam., with minute, sparsely distributed, glandular hairs in inconspicuous channels, raceme a quarter to half as long as peduncle, similarly puberulus, bracts deltoid, apiculate, up to 9 mm. long, 8 mm. broad at base, membranous, transparent, with several light reddish-brown veins; pedicels cernuous, becoming erect as fruit ripens, lowest up to 20 mm. long becoming shorter towards apex of raceme, puberulus. *Flowers* 3–10, pendulous, with faint vanilla-like scent. *Perianth* glabrous; outer segments up to 15 mm. long, 6 mm. broad, patent, oblong, with very slightly cucullate apex, bright yellow with narrow green median stripe; inner segments up to 12 mm. long, 5 mm. broad, erect, connivent, ovate, pale yellow with narrow green median stripe, apex cucullate, 1 mm. long. *Androecium* three sterile and three fertile stamens; outer filaments ovate-lanceolate, up to 9 mm. long, 1·5 mm. broad, with mucronate, sterile tip; inner filaments spade-shaped, lower part 1·5 mm. long, 1·5 mm. broad, upper part 5·5 mm. long, less than 1 mm. broad; anthers 4 mm. long, apex rectangular, base spreading. *Gynoecium* glabrous; ovary ellipsoidal in longitudinal section, carpels rounded dorsally, without basal shields, 5 mm. long, 3 mm. diam., green; style oblong with slightly narrower section in upper third, triquetrous, 5 mm. long, 1 mm. diam, yellow; stigma convex, 3-lobed, lobes simple each with a row of minute papillae, green. *Fruit* a trilocular capsule, apex acute when green; seeds numerous.

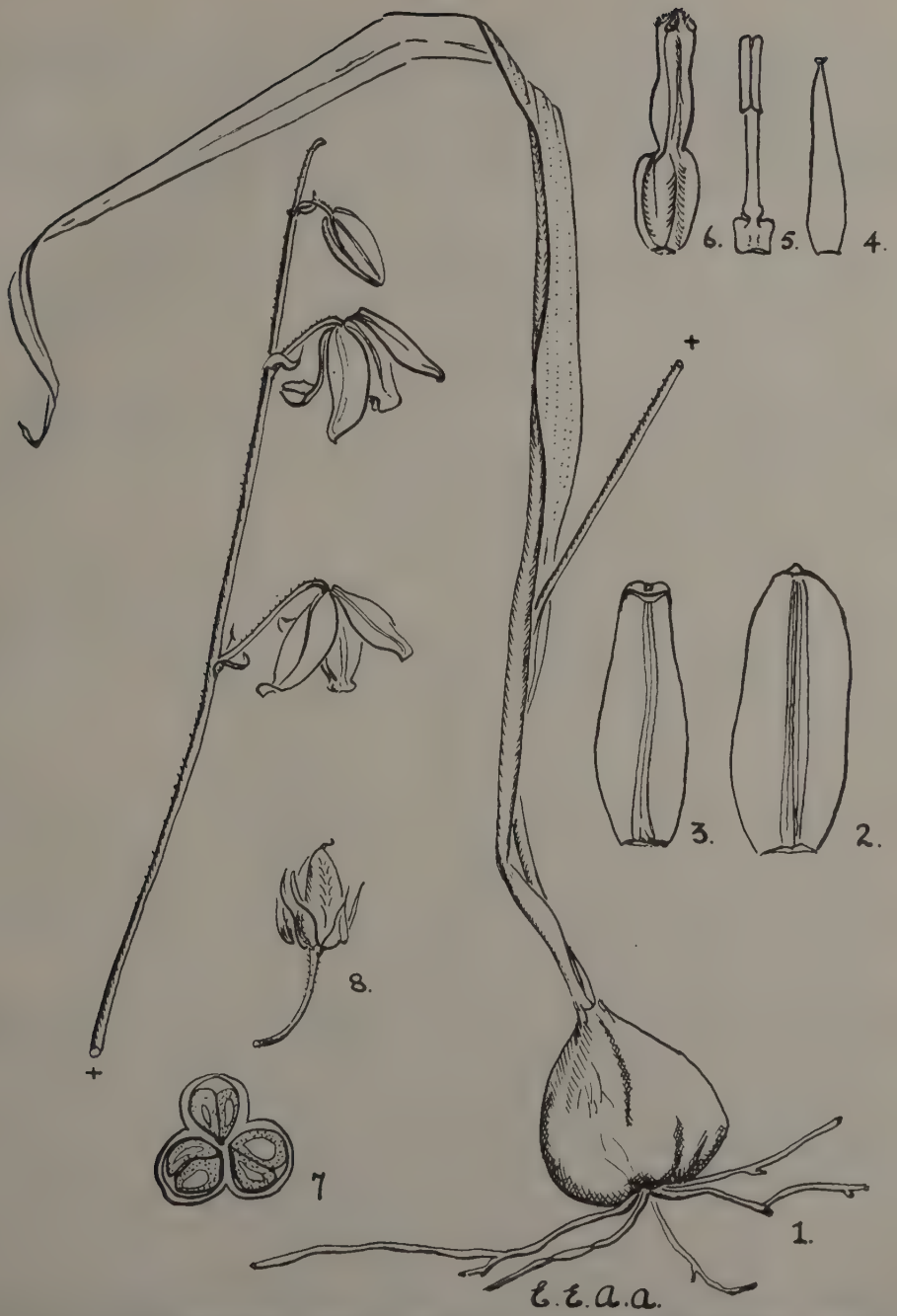

FIG. 4.—1, *Albuca crudenii*; 2 and 3, outer and inner perianth segments; 4 and 5, sterile and fertile stamens; 6, gynoecium; 7, cross-section of ovary; 8, developing fruit.

In describing this new species I wish to pay tribute to the late Dr. S. Schonland, former Curator of the Albany Museum and founder of the Department of Botany at Rhodes University, Grahamstown. In the Albany Museum Herbarium there is a single specimen of this species labelled " Albuca Crudeni Schonl. n.sp.". It was collected by Mr. F. Cruden at Alicedale in September, 1917 (Cruden, No. 14a). Dr. Schonland made copious notes on many other species of *Albuca* in the herbarium but this sheet is devoid of any other comment than the manuscript name.

In October 1953 I collected plants at Dassieklip and subsequently found that they matched Cruden's specimen. As the description was drawn up from the fresh material collected at Dassieklip this has been designated as the type, but I retain the name suggested by Dr. Schonland to commemorate Mr. Cruden who discovered several interesting plants in the eastern Cape Province.

Dassieklip is an interesting little poort in the Albany District where the old road between Port Elizabeth and Grahamstown passes through a fault of Witteberg Quartzite on the east bank of the Bushman's River. The krantz faces south and consequently is in the shade for a large part of the day. On its rock ledges are to be found small ripens, lowest up to 20 mm. long becoming shorter towards apex of raceme, puberulus. colonies of *A. crudenii* and many other small geophytes as well as that rather uncommon fern *Ophioglossum nudicaule*, L.f.

A. crudenii falls into the section Eu-albuca because it has three fertile and three sterile stamens. It is quite distinct from any other species so far attributed to this section in that it has only one leaf, or, very rarely, two. The only other species in the section that has glandular leaves is *A. glandulosa*, Bak. which, however, has white flowers with glandular hairs on the perianth segments, a turbinate, puberulus style and flat stigma as well as many other minor dissimilarities.

Aloe alooides (*Bolus*) *van Druten* comb. nov.

Urginea alooides Bolus in Journ. Linn. Soc. 18: 395 (1881).

Notosceptrum alooides Benth. in Gen. Pl. 3: 775 (1883); Bkr. in Fl. Cap. 6: 285 (1897).

Aloe recurvifolia Groenewald in Tydskrif vir Wetenskap en Kuns 39 (1935); Reynolds in Fl. Pl. S. Afr. 16: Plate 801 (1935), in Journ. of S.A. Bot. 6: 111, Plate 10 (1940), The Aloes of S. Afr. 436 (1950).

During research work at the National Herbarium the iso-type of *Urginea alooides* was obtained on loan from the South African Museum, Cape Town. The specimen consists of an inflorescence which was found to be an excellent match of the type of *Aloe recurvifolia* Groenewald, which is the name in current use for the plant.

Bolus had originally described this plant as *Urginea alooides* and stated " A remarkable species with the aspect of an Aloe. It is readily distinguished by its long densely flowered spike. I have only seen the flowering scapes; but the leaves were described to me by the late Mr. MacLea, an energetic collector in the region indicated ". In a note attached to his collection MacLea states " I considered it an Aloe of some kind, its habit of growth and long fleshy strap-shaped leaves gave me that impression. It affects same habit as most Aloes, grows on slopes of mountains facing North-East. The present was growing amongst quartzite rock and shingle near Mac-Mac. I remember distinctly the reason I gathered no plants or leaves was on account of their size and thick fleshy nature—not so sure about the leaves being strap-shaped or linear-lanceolate. I think they were the former and pendulous at the extremities and not less than 2 ft. long. More than one flower spike to each plant." It seems strange

that, with this information, Bolus should have placed the plant in the genus *Urginea* but he apparently ruled out the genus *Aloe* because of the very small-flowered dense spike.

In his Genera Plantarum Bentham transferred Bolus's species to his new genus *Notosceptrum* and it was retained there, tentatively, by Baker in Flora Capensis. Nothing further was done until the present investigation, and although it is unfortunate that so apt a specific epithet as *recurvifolia* must be changed, there is no doubt that the plant must bear the name *Aloe alooides*.

VITACEAE.

Cissus natalitia (*Szysz.*) *L. E. Codd*, comb. nov.

Vitis natalitia Szysz., Polypet. Rehmann., 2: 45 (1889).

Cissus connivens Lam. var. *meyeriana* Planch. in DC. Monog. Phan. 5: 584 (1887), partly; Gilg and Brandt in Engl. Bot. Jahrb. 46: 516 (1912), partly; Suessenguth in Pflanzenfam. 20d: 250 (1953), partly.

C. glabra E. Mey. in Drège, Zwei Pfl. Docum. 173 (1843), nomen nudum; Planch. l.c. 584, in synonomy.

C. orientalis Harv. in Fl. Cap. 1: 253 (1859/60), partly, non Lam.

The specimens cited by Szyszylowycz are as follows:—

NATAL.—Ladysmith, *Rehmann* 7136; Biggarsberg, *Rehmann* 7098; Vildshill, Pinetown, *Rehmann* 7991.

In Flora Capensis, Harvey mis-identified two specimens as *Cissus orientalis* Lam., namely, *Drège*, from between the Umtata and Umzimvubu Rivers, and *Burke and Zeyher*, from the Magaliesberg. Planchon placed the two specimens under *C. connivens* Lam. var. *meyeriana* Planch., a treatment followed by Gilg and Brandt, while the species *C. orientalis* Lam. he removed to the genus *Ampelocissus*. A study of available herbarium material, together with observations in the field, led to the conclusion that these specimens are representative of two distinct species.

The Burke and Zeyher specimen was given specific rank as *C. sulcatus* C. A. Smith in Burtt Davy's Flowering Plants and Ferns of the Transvaal and Swaziland, 2: xx, 477 (1932). Thus the question arose as to whether a specific name was available for the Drège specimen. Judging by the localities and descriptions, it seemed probable that it would prove to belong to the same species as the Rehmann specimens described as *Vitis natalitia* Szysz., and this view was confirmed by our liaison officer at the Kew Herbarium.

A comparison between the species *C. sulcatus*, *C. natalitia* and *C. connivens* was made possible through the kindness of the Director of the Muséum National d'Histoire Naturelle, Paris, who sent us a portion of Lamarck's type on loan. The conclusion reached is that *C. sulcatus* is more closely related to *C. connivens* than is *C. natalitia* and that, while there are sufficient grounds for regarding *C. natalitia* as a good species, more material is required from Madagascar, the type area for *C. connivens*, for a correct evaluation to be made of the status of *C. sulcatus*. In separating *C. sulcatus* from *C. connivens*, C. A. Smith states very briefly that his species differs in the multipinnate not bipinnate leaves, and in the fruits, though he fails to indicate how the fruits differ. In the present state of our knowledge, the three species may be distinguished as in the following key:—

Stipitate glands usually present; leaflets regularly dentate from base to apex; stems thick, sparingly branched..... *C. natalitia.*

Stipitate glands absent; leaflets crenate-dentate mainly towards the apex; stems thin, much branched

Leaves bipinnate; leaflets cuneate or acute at the base..... *C. connivens.*

Leaves often multipinnate; leaflets rounded or obtuse at the base..... *C. sulcatus.*

C. natalitia is distributed from northern Natal to the Transkei and, in addition to the Drège and Rehmann specimens mentioned previously, is represented by the following specimens:—

NATAL.—Ngotshe, *Codd* 7024. Nongoma, *Gerstner* 718. Hlabisa, *Codd* 2010. Nqutu, *Codd* 2401. Dundee, *van der Merwe* 2649. Klip River, *Acocks* 13855. Weenen, *Medley Wood* 10132; *Acocks* 10709. Eshowe, *Gerstner* 2406. Mtunzini, *Mogg* 5909, 6013. Pietermaritzburg, *Killick* 262; *Codd* 6795. Camperdown, *McClean* 143. Port Shepstone, *Galpin* 11012.

CAPE.—Port St. Johns, *Howlett* 43; *Bruce* 451. Kentani *Pegler* 890.

C. sulcatus is so far recorded only from the central Transvaal, as indicated by the following collections:—

TRANSVAAL.—Brits, *Hutchinson* 2326; *C. A. Smith* 3443; *Mogg* s.n.; *Hofmeyr* s.n.; *Leendertz* 713. Rustenburg, *Codd* 6364; *Pole Evans* s.n; Waterberg, *van Son* in TM. 30435.

PLATE I.—*Rhus batophylla* L. E. Codd, sp. nov. (Codd and Dyer 7699).

The Oleaceae of Southern Africa.

By

I. C. Verdoorn.

The area covered in this revision is the Union of South Africa, Swaziland, South West Africa, and the region of the Bechuanaland Protectorate which lies between South West Africa and the Transvaal. To date, collecting in South West Africa and the Protectorate has not been extensive and so the citations from these regions may give a wrong impression—the family may be better represented there than it appears to be.

All the material of Oleaceae from the following herbaria was sent on loan for examination and most of the specimens seen have been cited (the symbols used in the citations follow the names): Bolus Herbarium (BOL); South African Museum (SAM); Kirstenbosch (NBG); Albany Museum (GRA); Natal Herbarium (NH); Witwatersrand University (J); Forest Department (FD); Ryksherbarium, Leiden (L); and the Natal University Herbarium, Pietermaritzburg (PMB). A number of specimens specially asked for were sent from the Royal Botanic Gardens, Kew (K).

In the citations of the specimens, if a specimen is in the National Herbarium, Pretoria (PRE), no symbol follows it; if not at Pretoria but in one or more of the other South African Herbaria, the symbol of ONE of them is added—e.g. Pillans 5271 (BOL), even if it is also in the Kirstenbosch herbarium; if the specimen is in the Kew or Leiden herbarium or both these overseas herbaria their symbols are added in every case together with one of the South African herbaria (including Pretoria in this instance) if it is also in that herbarium—e.g. Burchell 8236 (K, L, GRA) or Grenfell 869 (K, PRE). In view of the large number of specimens examined this economy in the use of symbols, instead of cutting out some citations, seems to be justified.

Among the abbreviations used in the citations of literature the only one that may not be easily recognised is F.T.E.A. for the " Flora of Tropical East Africa ".

The decision as to the correct authority for certain species needs some explanation. Harvey's species *Menodora juncea* was published in Harvey's Genera Plantarum, 2nd edition, four years after his death, edited by J. D. Hooker. It has been suggested that the name should be attributed to " Hook. f." rather than to Harvey. Article 58 of the International Code of Botanical Nomenclature provides that if the publishing author supplied the description his name should be retained rather than that of the one who proposed the name but did not publish it. In this case, however, all the description there is of *Menodora juncea* is Harvey's, based on the material in his herbarium and therefore, in my opinion, Harvey is the correct author of the species.

In like manner the descriptions of *Jasminum breviflorum*, *J. gerrardi* and *Olea enervis*, published several years after Harvey's death by Wright in the Flora Capensis, were essentially Harvey's and therefore if abbreviating the authority " Harvey in Wright " Harvey's name should be retained in preference to the publishing author who did not supply the original description.

In the case of *Jasminum streptopus*, the authority given in the Index Kewensis and the Flora Capensis, is " E. Mey. ex DC.", but Meyer described this species in his " Commentariorum " in 1837 and is therefore the author without qualification. This applies also to *J. angulare* var. *glabratum* E. Mey. and a few more of his varieties in this genus.

I am much indebted to the Directors of the herbaria mentioned above, not only for the loan of the specimens but, in many cases, for assistance and advice from them and members of their staffs. I am also indebted to the Directors of the herbaria at Berlin-Dahlem, Geneva and Paris for photographs of type specimens.

FAMILY CHARACTERS.

Trees, shrubs, climbers or occasionally low herbaceous woody-based plants. *Leaves* opposite (rarely alternate in the low sub-herbaceous plants), exstipulate, simple or compound, acarodomatia sometimes present on underside of leaves in axils of veins. *Inflorescence* cymous usually paniculate or occasionally only one flower developing, or flowers appearing fascicled. *Flowers* regular, hermaphrodite or occasionally unisexual, sometimes with heterostylous arrangement. *Calyx* shortly or deeply 2–15-lobed. *Corolla* gamopetalous, 4 or more lobed, sometimes lobed almost to the base. *Stamens* normally 2, epipetalous. *Ovary* superior, bilocular with 2 to 4 ovules in each loculus. *Fruit* dry or fleshy, dehiscent or indehiscent.

Key to Genera.

Fruit a woody capsule; corolla salver-shaped, tube well developed, lobes spreading, with a group of swollen brown to purplish hairs at the base of the lobes.... 1. *Schrebera.*

Fruit a drupe, berry or membranous capsule, never a woody capsule; corolla-lobes without a group of swollen brown to purplish hairs at their base:
Fruit a drupe or berry; trees, shrubs or climbers:
Corolla-tube long and slender; lobes narrow; fruit a berry, 2-lobed, one usually aborting; climbers or bushy shrubs..... 2. *Jasminum.*

Corolla-tube short to almost none:
Leaves without acarodomatia; calyx toothed or shallowly lobed; corolla-tube short but distinct, lobes only slightly longer than broad; inflorescence terminal or axillary, very many flowered; ovules pendulous, seed albuminous..... 3. *Olea.*

Leaves on flowering branches usually with acarodomatia; calyx deeply lobed; corolla-tube very short, usually slit to base between alternate lobes, lobes usually appearing distinctly longer than broad* because of deeply infolded margins; apex cucullate; inflorescence axillary often on old wood, few-flowered; ovules attached ventrally; seeds exalbuminous, cotyledons thick..... 4. *Linociera.*

Fruit a membranous capsule; low virgate shrublet or herbaceous plant with woody base; corolla yellow..... 5. *Menodora.*

* Except in *L. latipetala* in trop. Africa.

1. SCHREBERA.

Roxb., Pl. Coromandel 2: 1, t. 101 (1798) nomen conservandum; Harv. ex Wright in Fl. Cap. 4, 1: 482 (1907); Phill. Gen. S.A. Fl. Plants Ed. 2: 571 (1951); *Nathusia* Hochst. in Flora (1841).

Trees or shrubs (sometimes sub-scandent?). *Leaves* opposite, compound (simple in some species outside S. Africa), rhachis usually winged. *Inflorescence* a paniculate cyme. *Flowers* heterostylous. *Calyx* campanulate, loosely enveloping the corolla, truncate or irregularly and obscurely lobed. *Corolla* salver-shaped, white, sometimes tinged with pink or puce; tube well developed, cylindrical; segments 6 or more, spreading to reflexed, each with a group of swollen brown to purplish hairs at the base. *Stamens* 2, inserted on the corolla either in the throat with the anthers exserted or a little below the throat with the anthers included; filaments short, anthers large, introrse.

Ovary bilocular, small, truncate or obscurely bi-lobed at apex; ovules 4 in each loculus; style filiform; stigma included or exserted, subcapitate or oblong in outline. *Capsule* bi-valved, woody with loculicidal dehiscence; seeds produced into a long solitary subapical wing.

Type species: *S. Swietenioides* Roxb., Burma.

The genus *Schrebera* is found in Africa and India, mostly in the tropics. The two species that extend into S. Africa have compound leaves. There is not a single record of a simple-leaved species from inside the Union, the nearest being *S. trichoclada* Welw., found quite frequently in the Zambesi basin with one record as far south as Lundi, S. Rhodesia. In P.E.A. the southernmost record is on the north bank of the Save River.

Key to Species.

Branchlets glabrous or occasionally puberulous; leaves glabrous; branches of inflorescence and calyx persistently puberulous, never tomentulose nor quite smooth; cymes not very compact..... 1. *S. alata.*

Branchlets grey or silvery tomentulose; leaves pubescent or glabrescent; branches of inflorescence and calyx tomentulose, the calyx sometimes becoming quite smooth (never puberulous); cymes compact..... 2. *S. argyrotricha.*

1. **Schrebera alata** (*Hochst.*) *Welw.* in Trans. Linn. Soc. Bot. 27: 41 (1869); Turrill in F.T.E.A. (1952); *Nathusia alata* Hochst. in Flora 24. 1: 25 and 2: 672 (1841); *Schrebera saundersiae* Harv. in Thes. Cap. 2: 40, tab. 163 (1859); Wright in Fl. Cap. 4, 1: 483 (1907); *Schrebera latialata* Gilg in Bot. Jb. 30: 73 (1901).

Tree (said to occur occasionally as a sub-scandent shrub in Natal), found in the marginal flora of forests and the coastal bush in Natal, sometimes small, more or less 12 feet tall with slender stem and branches, or about 25 feet tall with stem 1 foot in diameter, bark greyish or light brown in colour. *Branchlets* glabrous or puberulous, not tomentulose. *Leaves* glabrous, 5–13 cm. long, 5-foliolate, sometimes 3-foliolate; leaflets varying considerably in size, texture and shape, the lateral elliptic to broadly elliptic or oblong, unequally cuneate at the base, about 3–7 cm. long and 1–4 cm. broad, the terminal usually a little larger than the other leaflets, more obovate oblong, sometimes elliptic, subsessile or cuneate into a petiolule up to 1 cm. long; petiole and rhachis winged, wing variable, narrow or broad, auricled at base or not. *Inflorescence* puberulous, about 6 to 11 cm. long, the lateral branches slender, usually over 2 cm. long; bracts deciduous variable in size, some 5 mm. long and 2 mm. broad, often narrower, rarely broader. *Calyx* more or less tubular-turbinate, persistently puberulous outside sometimes densely so, almost velvety, pubescent in upper portion within, more or less truncate and slit or variously lobed, persisting in fruit. *Flowers* sweetly scented, white suffused with pink or puce at different stages, tube cylindrical about 1·4 cm. long, glabrous or variously puberulous in parts outside, often pubescent with rather long hairs near the base within; lobes suborbicular, about 5 mm. long, crenate on margins, spreading, with a cluster of glandular reddish-brown hairs near the base on inner face. *Stamens* 2, heterostylus, inserted near the apex of the corolla and then exserted or in other specimens below the apex and then included. *Ovary* 2-celled, about 1·5 mm. long, somewhat flattened and puberulous on top, obscurely 2-lobed; ovules 4 in each cell, pendulous; style about 1·5 cm. long, glabrous or sometimes sparsely pubescent with short patent gland-tipped hairs, long exserted in flowers with stamens included and vice versa; stigma about 1·5 mm. long, obscurely 2-lobed. *Capsule* green when young (turning black on drying) becoming light brown at maturity, puberulous except at base within calyx, obovate-oblong, slightly laterally flattened at right angles to the septum, parallel to the wall of division with a ridge along the septum. *Seeds* 8 mm. long with an oblong 1·1 cm. × 6 mm. subterminal wing (degree to which wing runs down one side varies, also width).

Fig. 1.

Type: Schimper 245, Abyssinia. Types of synonyms: *S. saundersiae* Harv., *Gerrard* 1153, Durban; *S. latialata* Gilg, *Medley Wood* 5201, Durban.

TRANSVAAL.—Soutpansberg: Entabini, Maviewa Kop, *Poynton* 78 (F.D.); Sibasa, *Junod* in Tvl. Mus. 21199; nr. Sibasa, Tshaulau, *Codd* 6913 (leafy branch, 3-foliate); *van Warmelo* s.n. (3 sheets). Pilgrims Rest: Kowyns Pass, *Codd & Verdoorn* 7604; *Story* 4000; Mariepskop, *van Son* in Tvl. Mus. 30712; *Fitzsimons & Van Dam* in Tvl. Mus. 26,537; *Keet* in F.D. Herb. 5916; *Forester* in F.D. Herb. 8119. Lydenburg: Magalieskop, *Kotze* in F.D. Herb. 2816. Barberton: Summit Rimers Creek Gorge, *Galpin* 1115.

FIG. 1.—Schrebera alata (Hochst.) Welw. from Graskop, Transvaal. Branchlets glabrous but branches of the inflorescence and calyces puberulous; wings on petiole and rhachis not obvious on drawing; *a*, dehiscing capsule; *b*, seeds.

NATAL.—Ingwavuma: *Codd* 7034. Ubombo: *Gerstner* 4551 (leafy specimen, wings broad). Eshowe: *Lawn* 863 (NH). Mapumulo: Nonoti, *Medley Wood* 10366. Inanda: Tongaat, *McKen* 17 (NH); Inanda, *Medley Wood* 819 (NH). Durban: *Gerrard* 1153 (type no. of S. saundersiae Harv.); *Medley Wood* 11839; *Medley Wood* 12016 (NH); Berea, *Medley Wood* 5201 (type no. of *S. latialata* Gilg); *Medley Wood* 11042 (L). Umlazi: Umlaas, *Maurice & Evans* 329 (mixed sheet, centre S. argyrotricha) (NH). Camperdown: between Drummond & Inchanga, *Butcher* in NH. 17694.

Also found northwards to Angola and Abyssinia.

Morphological variation in this genus makes the definition of its species very difficult and as it becomes better known in Africa the tendency is to return to a broad view of the species. Turrill in " Flora of Tropical East Africa ", 1952, takes this broad view and sinks under *S. alata* (Hochst.) Welw. the following East African species: *S. obliquifoliolata* Gilg, *S. merkeri* Lingelsh. and *S. nyassae* Lingelsh. Under this treatment *S. saundersiae* Harv. from Natal must be sunk under it too and in fact, as far back as 1869 when Welwitsch made the combination " *Schrebera alata* " for *Nathusia alata* Hochst., he was of the opinion that *S. saundersiae* Harv. was conspecific with Hochstetter's Abyssinian plant and his own specimens from Angola, and cited all these specimens under the name *Schrebera alata* (Hochst.) Welw. Gilg, however, resuscitated it and described several new species, most of which are now again sunk. With its capacity to vary in size, shape, and texture of leaves and the degree to which the rhachis is winged one may find specimens from neighbouring trees appearing very different, sometimes more so than a specimen from Abyssinia and one from Natal.

Among Gilg's species is *Schrebera latialata*, the type being a Medley Wood specimen from Berea, Durban, that is from the same area as *S. saundersiae* Harv. The characters which distinguish Gilg's species, for instance the broad wings on the petiole, have been proved to vary from season to season, probably according to the rains and the amount of shade the plant gets, and it can therefore not be upheld and goes, with *S. saundersiae*, into the synonymy of *S. alata*.

The species is distinguished from *S. argyrotricha* Gilg mainly by the glabrous or glabrescent branchlets (not densely tomentulose); glabrous leaves; branches of the inflorescence and calyx being evenly puberulous; and the rather open, not compact, cymes. In some cases it may be difficult to distinguish between these species and the suggestion that the differences are not specific may present itself. But the difference in the pubescence is not merely one of degree but a different type of pubescence. In *S. alata* the new growth is glabrous or puberulous, never silvery tomentulose, and the branches of the inflorescence are puberulous and the calyx densely and persistently so, whereas in *S. argyrotricha* the branches of the inflorescence are silvery tomentulose while the calyx sometimes becomes quite smooth, especially in the upper half. In this latter species one often finds a smooth calyx and silvery pubescent pedicel while in *S. alata* this is never the case, the pedicel and calyx being evenly puberulous. *S. alata* is usually a bigger tree with rather larger leaves and more open inflorescence. It is found only in forest or on the fringes of forests in mountainous country and in the south in the coastal bush of Natal.

2. **Schrebera argyrotricha** *Gilg* in Bot. Jb. 30: 74 (1901); Wright in Fl. Cap. 4, 1: 483 (1907); *S. gilgiana* Lingelsh. in Pflanzenr. 72: 108 (1920); *S. mazoensis* Sp. Moore in J. Bot. Lond. 45: 48 (1907).

Small trees (or shrubs) in dry bushveld, often with a short main stem about 3 feet long, and several long erect smooth branches, but sometimes trees about 18 feet tall; young branchlets grey or silvery tomentulose. *Leaves* 3–5-foliolate, 4–10 cm. long, grey green in effect owing to the pale ashy pubescence which is persistent in western area plants, while those from eastern regions are glabrescent; leaflets variable in shape and size, the lateral from 1·5–7·5 cm. long and ·8–3·5 cm. broad, usually very broadly elliptic-oblong, the terminal subsessile, slightly larger, more or less obovate

and shortly cuneate at the base, upper surfaces slightly darker than the lower, both surfaces pubescent or (in eastern regions) glabrous; petiole and rhachis narrowly to broadly winged, variously auricled at or near the base or without auricles. *Inflorescence* tomentulose, 2–7 cm. long, cymes compact; bracts deciduous, variable in size, lower up to 1 cm. long, 9 mm. broad, upper usually 5 mm. long and 3 mm. broad, innermost narrower, more or less spathulate. *Calyx* silvery pubescent to glabrescent outside, smooth at least in top half, minutely puberulous on upper portion within, tubular-turbinate, truncate, slit or shallowly lobed, persistent in fruit. *Corolla* sweetly scented, white suffused with pink or puce at different stages; tube cylindrical, smooth outside and with a few long hairs about the centre within, about 1 cm. long; lobes often 7, spreading abruptly to slightly reflexed, about 4–5 mm. long and 3·5–4·5 mm. broad, irregularly crenate on the margins with a cluster of glandular reddish brown hairs near the base on inner face. *Stamens* 2, heterostylus, inserted near the apex of the tube and then exserted or, in other specimens, below the apex and then included. *Ovary* 2-celled, about 1·5 mm. long, subtruncate and obscurely 2-lobed at the apex, very shortly pubescent on top; style about 1 cm. long, usually glabrous; stigma long exserted in flowers with stamens included and vice versa, bifid, lobes about 1·5 mm. long, adhering to each other. *Capsule* green and pubescent when young (turning black on drying), light brown at maturity, oblong obovoid slightly laterally flattened, with a ridge along the septum. *Seeds* about 7 mm. long, with a subterminal, oblong wing about 9 mm. long and 6 mm. wide, sometimes narrower (wing varies in width and degree in which it runs down one side).

Fig. 2.

Type: Wilms 201, Lydenburg. Types of synonyms: *S. mazoensis* Sp. Moore, *Eyles* 202, S. Rhodesia; *S. gilgiana* Lingelsh., syntypes, *Marloth* 3403, S. Rhodesia, *Rehmann* 5950, Transvaal, *Landauer* 150, Natal.

Transvaal.—Soutpansberg: Machava, *Acocks* 8861; Elim, *Botha* 2 (two gatherings) and in F.D. Herb. 10735. Pietersburg: Blaauwberg *Smuts* and *Pole Evans* 919 (small leaves, 3-foliolate); *Bremekamp* and *Schweickerdt* 113, (leaves small); *Codd* 8676 (leaves large, 3–5-foliolate); *Codd* and *Dyer* 9178 and 9120 (small leaves). Letaba: Houtbos, *Rehmann* 5950, syntype of S. gilgiana (Bol); Modjadjies Reserve, *Krige* 206. Waterberg: Palala Heights, *Meeuse* 9638; near Naboomspruit, Vischgat, *Galpin* 8855; Nylstroom hills, *Mogg* s.n. and in Moss Herb. Wits. 26475; near Warmbaths, *Smuts* s.n.; *Codd* 2961; *Marais* 268; 269; *Verdoorn* 2400; 2401; 2402 (coppice shoots); 2403 (after flowering). Pilgrims Rest: Graskop, Lothian Reserve, *Joubert* in F.D. Herb. 8720; near Leydsdorp, *Stapelton* in F.D. Herb. 8462. Lydenburg: Waterfall (type locality), *du Plessis* 1; 2; 3; *Marais* 63; 64; 66; *Verdooen* and *Codd* 7614; 7615; 7618; Penge Mine, *Codd* and *Dyer* 7755; Buffelsvlei, *Story* 4076. Nelspruit: near Pretorius Kop, *Codd* 6053; *Codd* and *de Winter* 4883; *Acocks* 16620; *v. d. Schyff* 169; Shabin, *v. d. Schyff* 1469 (glabrous); Klokwene, *v. d. Schyff* 181; Skukuza, *Cholmondeley* s.n.; near Nelspruit, *Mogg* s.n.; Plaston, *Holt* 303 (NH); Junction Nels and Corodile Riv., *Liebenberg* 2621. Barberton: *Thorncroft* 606 (NH); *Williams* in Tvl. Mus. 10447; *Thorncroft* 606 (NH); Roses Creek, *Mathews* 144.

Swaziland.—Mohlangotsha Mtn., Mankiana, *Miller* S/267.

Natal.—Nkandhla, Insuzi Gorge, *Acocks* 12730; Mapumula: Monoti, *Medley Wood* 8789 (NH).

Also occurs in S. Rhodesia and Portuguese East Africa (possibly also in Tanganyika for Turrill in F.T.E.A. cites a specimen which he names *S. mazoensis* from Kondoa, T.T.).

FIG. 2.—Schrebera argyrotricha Gilg., from the waterfall, Lydenburg. Branchlets and branches of the inflorescence tomentulose, calyces glabrescent in parts; *a*, dehiscing capsule; *b*, seeds.

Two ecotypes are found in this species, the specimens from the western and central areas being densely and persistently silvery tomentulose while those in the eastern regions have a tendency to glabrescence in parts. In these eastern specimens the calyces are often quite smooth while the pedicels and the rest of the inflorescence are silvery tomentulose; the leaves may be glabrous but new growth usually has the characteristic tomentulose pubescence. By a strange coincidence the two ecotypes, the western and eastern forms both occur at the type locality of *S. argyrotricha*, the Waterfall near Lydenburg. Through a personal visit to that locality the error of considering these forms as distinct species was avoided. The Waterberg and Rhodesian specimens with the conspicuous tomentulose twigs had been taken to be *S. mazoensis* while specimens with smooth calyces and less hairy leaves were named *S. argyrotricha*. On the visit to the Waterfall where Wilms collected the type specimen described as having a glabrescent calyx, specimens of Schrebera were found to be quite plentiful. Those growing in exposed positions were as densely and persistently tomentose as the specimens in the Waterberg and S. Rhodesia, while others, sometimes only a few yards away, but growing in the shade of the cliff, had smooth calyces and more or less glabrous

leaves. Further examination of specimens from Rhodesia, Transvaal, Swaziland and Natal supported the view that they belong to one species but occur in the two forms described.

As in *S. alata* so in this species there is a great deal of variation in the size, texture and shape of the leaflets, in their number, 3 or 5, and the degree to which the rhachis is wniged and auricled. For this reason *S. gilgiana* Lingelsh. can hardly be maintained on the small size of the leaflets since the measurements fall within the range of size of our species. The 3 specimens cited come from 3 distant localities, Rhodesia, Transvaal and Natal but also well within the range of distribution of *S. argyrotricha*. To illustrate the unreliability of leaf size, two specimens in the National Herbarium from the Blaauwberg, collected at different times, both had small 3-foliolate leaves. In a recent expedition to that remote spot the botanist was asked to look out for this Schrebera and material was brought back with the normal sized leaflets and most of the leaves 5-foliolate.

Notes that may assist in distinguishing this species from *S. alata* are given under the latter species.

Among the tropical species *S. argyrotricha* is most like the description of *S. tomentella* (Welw.) Gilg which however has larger leaves, outside the range of variation in size of our species.

Another tropical species, *S. greenwayi* Turrill, is very like the eastern form of *S. argyrotricha*, having almost glabrous leaves and the calyx smooth in part in contrast to the pubescent pedicel but in this case the tomentum on the new growth may be considered to differ in some respect from that of our species.

2. JASMINUM.

Linn., Gen. Pl., ed. 5: 7 (1754); Harv. ex Wright in Fl. Cap. 4, 1: 479 (1906); Phill. Gen. S.A. Fl. Plants ed. 2: 571 (1951).

Climbing, scrambling or erect shrubs or shrublets. *Leaves* compound or reduced to one leaflet, digitately or pinnately 3 or more foliolate, usually opposite. *Inflorescence* consisting of a solitary flower or a few flowered simple or compound cyme, terminal on main and lateral branchlets, sometimes axillary as well. *Flowers* white or yellow, sometimes flushed with rose, sweetly scented. *Calyx-tube* campanulate, lobes 4–13, often long and subulate. *Corolla-tube* long and slender, lobes 4–11, imbricate, spreading abruptly. *Stamens* 2, inserted near the top of the tube, not exserted; filaments short. *Ovary* 2-locular with 2, rarely more, ovules in each loculus, attached near the base; usually only one ovule developing; style slender; stigma clavate or bi-lobed. *Fruit* a berry, deeply bi-lobed, usually one lobe aborting.

Type species: *J. officinale* L., India.

Under the common name "Jasmine" this genus is largely grown in gardens as an ornamental plant. At least two of our species are frequently found in cultivation, *J. multipartitum* and *J. angulare*.

Among a number of Indian species found in South African gardens there is one, identified here as *J. multiflorum* (Burm.) Andr.,* which seems to have become naturalised along the Umgeni River near Durban and possibly also in Barberton where it is frequently grown as a hedge. *J. multiflorum* is easily distinguished from the indigenous species by the ovate-cordate leaves which are mostly over 3·5 cm. long and 2·5 cm. broad and by the densely hirsute-tomentose twigs, pedicels and calyces including the long subulate calyx-lobes.

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* J. multiflorum (*Burm.*) *Andr.* = *J. pubescens* Willd. and *J. hirsutum* Willd. pro. parte non *N. hirsuta* L. (see Andr. Bot. Rep. t. 496 and B.M. 1991).

Another tropical Asian species which is quite commonly cultivated and which, when dried and pressed, may be confused with a S. African species is *J. humile* L. It has angled stems like our *J. angulare* and the calyx lobes are similar; although the leaves in the S. African species, *J. angulare*, may be pinnate occasionally they are constantly, or more commonly so, in *J. humile*. The growing plant, when in flower, could not be confused with our plant because the flowers are yellow instead of white.

A specimen in the Albany Museum Schonland 945 named *J. angulare*, is rather *J. humile*, and must have been found in cultivation or it may have been an escape.

Key to Species.

Leaves compound, 3–5–7-foliolate:
- Leaves usually digitately 5–7-foliolate, sometimes 3-foliolate but then specimens from the Transvaal; leaflets more than twice as long as broad; shrublets about 1½ feet tall..... 1. *J. quinatum.*
- Leaves usually 3-foliolate, sometimes some pinnately 5-foliolate; shrubs, twiners or scramblers:
  - Leaves narrowly linear-landeolate to linear-oblong, more than twice as long as broad, glabrous and without acarodomatia, only petioles pubescent..... 2. *J. tortuosum.*
  - Leaves ovate to oblong, seldom up to twice as long as broad:
    - Inflorescence fairly compact; petioles sub-erect; leaves (on pressed specimens) covering the base of the flowers, occasionally pinnately 5-foliolate 3. *J. angulare.*
    - Inflorescence of broad lax cymes, usually broader than long; petioles spreading; leaves (on pressed specimens) not covering the base of the flowers:
      - Inflorescence terminal and axillary only in upper leaves; acarodomatia, if present, in axils of lower veins only; leaflets usually under 5 cm. long; calyx small, under 2 mm. long..... 4. *J. fluminense.*
      - Inflorescence terminal and axillary; acarodomatia in axils of central and upper veins also; leaflets usually over 5 cm. long; calyx usually over 2 mm. long.... 5. *J. abyssinicum.*

Leaves unifoliolate:
- Calyx-lobes much shorter than the tube, very shallow or up to 1·5 mm. long, then thickened and conduplicate, apiculate, but never produced into a subulate upper portion; acarodomatia if present mostly in axils of basal or lower veins; petioles articulate in upper portion..... 6. *J. breviflorum.*
- Calyx-lobes almost as long as to much longer than the tube, subulate at least in upper half, if rather short then leaves with acarodomatia also in axils of upper veins:
  - Whole plant glabrous or inconspicuously puberulous in parts; no acarodomatia:
    - Glabrous plants with lanceolate-elliptic, glaucous leaves usually about 3 times as long as broad; petiole articulate in upper portion; inflorescence normally 3-flowered; restricted to south-western Cape..... 7. *J. glaucum.*
    - Twigs, at least, shortly densely and persistently puberulous; leaves rarely 3 times as long as broad; petiole articulate in lower half; flowers usually single on short pedicels..... 8. *J. multipartitum.*
  - Plants, at least in parts, conspicuously pubescent, either tomentulose or patently pubescent with straight or curled hairs:
    - Pedicels rather short and thick, usually about 5–7 mm. long, densely pubescent; calyx lobes up to 13, subulate, usually definitely longer than the tube; leaves without acarodomatia; twigs more or less tomentulose; petioles articulate, usually in lower half..... 9. *J. stenolobum.*

Pedicels rather long and slender, sparsely pilose or glabrous; leaves usually with acarodomatia; petioles short, articulate near apex.....	10. *J. streptopus* (aggregate sp.).
Leaves oblong-elliptic to ovate-oblong mostly 4–7 cm. long; inflorescence usually 3–5-flowered.....	10a. var. *streptopus*.
Leaves on the whole smaller and ovate-acuminate, mostly 1·5–3·5 cm. long; inflorescence usually 1-flowered.....	10b. var. *transvaalense*.

1. **J. quinatum** *Schinz* in Vjschr. Naturf. Ges. Zürich. 55: 245 (1910). *J. tortuosum* Harv. ex Wright in Fl. Cap. 4: 482 (1907) partly, as to specimens from Kalahari, non Willd. *J. lupinifolium* Gilg & Schellb. in Bot. Jb. 51: 83 (1914).

Sub-shrubs with erect or straggling stems about 40 cm. long from a creeping rhizome. *Twigs* ridged or angled, glabrous or thinly to densely pubescent with straight or crisped hairs. *Leaves* digitately 5-foliolate, sometimes 3-, 4- or 7-foliolate; petiole flattened, 1·5–5 mm. long, rarely up to 12 mm. long; leaflets with the central the largest, 12–40 mm. long, and 2–9 mm. broad, rarely larger, the lateral smaller and the outermost still smaller, glabrous or sparsely to densely pubescent with straight or crisped hairs, linear-lanceolate, lanceolate to ovate-lanceolate, apiculate at the apex, cuneate at the base into a petiolule-like claw, claw varying in length, that of the central leaf usually the longest, up to 5 mm. long, rarely longer. *Inflorescence* terminal, sometimes also axillary in the upper pair of leaves, cymes 1- to 3-flowered, the terminal and axillary forming what appears to be a sub-corymbose inflorescence; peduncle 0 to 20 mm. long, glabrous or pubescent; pedicels 3–12 mm. long, of some lateral 1-flowered cymes from axils of upper leaves up to 20 mm. long, glabrous or pubescent. *Calyx* glabrous, tube about 2·5 mm. long, usually 6-toothed, teeth somewhat unequal, 1–2·5 mm. long, rarely up to 3 mm. long, triangular with margins folded inwards, sometimes conduplicate, apiculate, sinuses U-shaped. *Corolla* white, tube 18–22 mm. long, usually 6-lobed; lobes 10–12 mm. long and about 4 mm. broad. *Stamens* apiculate, included. *Ovary* quadrate, about 1·5 mm. long; style 2-lobed, lobes 3 mm. long, eventually exserted. *Fruit* twin berries, often only 1 developing, globose, about 5 mm. diam.

PLATE 1.

Type: *Schlechter* 3914, Corocodile Riv., Lydenburg. Type of synonym: *J. lupinifolium* Gilg & Schellenb., *Wilms* 924, Lydenburg.

TRANSVAAL.—Pretoria: Hennops River, *Leendertz* in Tvl. Mus. 8174; 8212; Koedoespoort, *Mogg* 11788. Carolina: *Rademacher* in Tvl. Mus. 7473; Waterval Boven, *Rogers* 22639 (NH); 18386 (Tvl. Mus. 2511); *Pole Evans* 2619; Waterval Onder, *Prosser* 1228 (K, PRE); Bergendal, *Galpin* 12365; Steynsdorp, *Dieperink* 30. Belfast: near Draaikraal, *Codd* 8053; Schoenmanskloof, *Young* A355. Lydenburg: *Wilms* 924, syntype of J. lupinifolium Gilg and Schellenb. (L); near Corocodile River, *Schlechter* 3914 (type number); Spekboom River, *Young* A455; A456; Secocoeni Land, *Gray* 4186; along Sabi Road, *Smuts and Gillett* 2494; near Lydenburg, *Codd* 5646; 6663; 6664 (hairy form); *Codd and Verdoorn* 7599; Rooidraai, *Liebenberg* 3489; Origstad Valley, *Walters* 10762. Pilgrims Rest: *Rogers* 24260 (GRA). Piet Retief: *Galpin* 9667.

Not known to occur outside the Transvaal.

This species has a superficial resemblance to *J. tortuosum* Willd. of the eastern Cape and Wright, in the Flora Capensis, cites Wilms 924 and Rogers 2511 from the Transvaal, under *J. tortuosum* whereas both these specimens are *J. quinatum*. The resemblance is in the long narrow leaflets without acarodomatia, but the species are easily distinguished in that the leaves of *J. quinatum* are mostly digitately 5-foliolate

and only occasionally with some leaves 3- or 7-foliolate. Then the habit of the latter is a low shrublet forming a fairly dense growth from a creeping rootstock whereas *J. tortuosum* is a high climber, the slender voluble branchlets probably accounting for the name. Also the area of distribution for these two species is distinct.

In the Botanische Jahrbücher, 1914, Gilg and Schellenberg described *Jasminum lupinifolium* on 3 gatherings of Wilms, among them Wilms 924 which, as mentioned above, was cited by Wright under *J. tortuosum* Willd. From the description, and from the examination of Wilms 924 as represented in the Ryksherbarium, Leiden, it is obvious that this species is the same as *J. quinatum* and being a later homonym must be sunk under *J. quinatum* Schinz. The epithet " lupinifolium " is very apt, for the leaves are reminiscent of those of lupins. Although more often five, the leaflets vary in number from three to seven, the central being the largest with the longest petiolule. They all stand more or less erect and are so crowded on the pressed specimens that it is difficult to distinguish them.

Like in other species in the genus, *J. quinatum* may occur in a completely glabrous, a conspicuously hairy or an intermediate form. It is found on mountain slopes, among rocks on hillsides, in the open, along sandy stream banks and on shaly slopes in open woodland.

2. **J. tortuosum** *Willd.* Enum. 1: 10 (1809); DC. Prodr. 8: 311 (1844) excl. vars.; Harv. ex. Wright in Fl. Cap. 4, 1: 482 (1907) pro parte; *J. flexile* Jacq. Schoenbr. 4: 46, t. 490 (1804) non Vahl.

Twiner or scrambler with branches angled in parts, the ultimate usually hirsute in parts, hairs white, crisped. *Leaves* 3-foliolate; petiole hirsute especially along the upper surface, about 5–10 mm., rarely 2 cm. long; blade glabrous and without acarodomatia, 1·7–4 cm. long and ·5–1·4 cm. broad (rarely larger 4·5 × 2 cm.); acute or broadly rounded at apex, mucronate, cuneate at base into a petiolule, central petiolule the longest; midrib prominent below and running into the petiolule at the base. *Inflorescence* glabrous, terminal on the branches and on the lateral branchlets, and axillary in axils of the upper pair of leaves only, 3–5-flowered, peduncle 1–2·5 cm. long; pedicels 1–1·5 cm. long (rarely 2 cm. long). *Calyx* usually 5-lobed, sometimes 6, 2·5–5·5 mm. long; lobes from much shorter than the tube to about as long as the tube, 1–2·5 mm. long, triangular, acuminate, conduplicate, apiculate, sinuses U-shaped. *Corolla* white, usually 6-lobed, tube 1·5–2·7 cm. long; lobes up to 1·2 cm. long, 5 mm. broad. *Fruit* not seen.

Plates 2 & 3.

Type: *Willdenow* in Berlin-Darlem Herbarium, Cape Province.

Cape.—Mossel Bay: Grootplaats, *Muir* 2400. Oudtshoorn: Huis Riv. Pass, *Compton* 20327, rather broad leaves (NBG). Caledon: *Elbrecht* in Tvl. Mus. 19010. Somerset West: Gordons Bay, *Parker* 4305. Tulbagh?: *Drege* s.n. (L).

Not known to occur outside the Cape Province.

This species is not well represented and it is possible that the specimens cited are merely variants of *J. angulare*. They agree quite well with the type (see plate 2) and with Jacquin's figure, cited by DC. under *J. tortuosum* Willd., with the exception of Compton 20327 which has larger leaves, but agrees in the other characters, such as leaves glabrous, without acarodomatia, and usually more than twice as long as broad.

The 4 specimens from the Cape Province, cited by C. H. Wright in the Flora Capensis under *J. tortuosum*, have been examined and they are all *J. angulare*. The specimens cited from the Transvaal are *J. quinatum*, as mentioned in the notes under that species.

The Drege specimen in the Ryksherbarium, Leiden, cited here may be of the same Drege gathering as seen by De Candolle and identified with *J. tortuosum* Willd. (DC. Prodr. 8: 311). A photograph of the Leiden specimen is reproduced here, on the right-hand side of plate 3. As may be seen from a comparison of plates 2 and 3, it compares well with the type of the species.

3. **J. angulare** *Vahl* Symb. 3: 1 (1794); Willd. Sp. Pl. 38 (1797); Hooker in Bot. Mag. t. 6865 (1886); Harv. ex Wright in Fl. Cap. 4, 1: 481 (1907) excl. Burtt Davy 360. *J. capense* Thb. Prod. 2 (1794–1800); Thb. Fl. Cap. Ed. 1: 4 (1807–13). *J. angulare* var. *glabratum* E. Mey. Comm. 1 fasc. 2: 14 (1837); DC. Prodr. 8: 311 (1844). *J. natalense* Gilg. and Schellenb. in Bot. Jb. 51: 86 (1914) in part, excluding Schlechter 11749 from Komati Poort.

Shrub, usually scrambling or climbing, sometimes climbing up to 20 feet high in trees. Ultimate branchlets 4–30 cm. long, angled (at least in parts), angles ridged, glabrous to variously pubescent from thinly so to tomentulous and densely pubescent with crisped hairs. *Leaves* 3-foliolate, or occasionally a few pinnately 5-foliolate; petioles usually ascending, rarely patently spreading, 0·4–2 cm. long, glabrous, thinly pubescent or tomentulose; leaflets glabrous, thinly pubescent or tomentulose on both surfaces, acarodomatia often present on under surface in axils of lower veins, usually broadly ovate, sometimes oblong, variable in shape, with apex acute, mucronate or rounded, the terminal 1·3–4·5 cm. long and 0·6–2·5 cm. broad, with a petiolule ·3–2 cm. long, rarely lobed at the base, but when deeply lobed forming a pinnately 5-foliolate leaf; lateral leaflets usually distinctly smaller than the terminal with a petiolule 2–6 mm. long, sometimes longer. *Inflorescence* of 1 or 2 terminal, rather compact cymes (the leaves in pressed specimens usually concealing the base of the inflorescence), pedicels of lateral flowers about 1–2 cm. long, usually glabrous, sometimes thinly pubescent or rarely densely so. *Calyx* campanulate, usually glabrous, tube 2·5–3 mm. long, 7-toothed, teeth about 1·5 mm. long, varying in size. *Corolla* white, usually greenish outside (rarely pink, fide Galpin); tube 1·7–3·5 cm. long; lobes 5, about 1–1·5 cm. long, 6–7 mm. broad; stamens inserted in upper portion of tube, included filaments 2 mm. long, anthers 2·5 mm. long, distinctly apiculate, apicule 1 mm. long. *Ovary* brown, 1·5 mm. long, style ultimately exserted, 2-lobed, lobes about 5 mm. long. *Fruit* a globose berry, often in pairs, about 7 mm. diam.

Plate 4.

Type: *Drege* s.n., Cape Province. Types of synonyms: *J. capense* Thb., *Thunberg* s.n., Zeeko Riv., Uitenhage; *J. natalense* Gilg & Schellenb., syntypes, *Wood* 940, Weenen, *Kuntze* s.n., Ladysmith, *Bachmann* 1029, and *Beyrich* 77, Pondoland (*Schlechter* 11749 is *J. fluminense*).

Transvaal.—Volksrust: *Jenkins* in Tvl. Mus. 9300.

Natal.—Utrecht: *Wahl* in Tvl. Mus. 15388, some leaves 5-foliolate. Newcastle: Charlestown, *Medley Wood* 5166, 1 leaf 5-foliolate. Dundee: Blesboklaagte, *Codd* 2412. Nqutu: *Codd* 7666. Bergville: Oliviers Hoek Pass, *Medley Wood* 3515 (K, NH); Upper Tugela, *Gillett* 1146. Klip River: Ladysmith, *Acocks* 9987, some leaves 5-foliolate. Estcourt: *West* 1844 (specimen with fruits, leaves very small); *Acocks* 9939, some leaves 5-foliolate; Colenso, *Hutchinson* 1861; Mooi River, *Mogg* 7218, 5-foliolate leaf. Nkandhla: Qudeni Gerstner 2629 (NH). Pietermaritzburg; Scottsville, *Fisher* 701 (superficially looks like J. fluminense); Umsindusi River, *F.G.C.* 669. Harding: *Oliver* 97 (NH). Umzinto: Dumisa, Campbelltown, *Rudatis* 1860 (L). Without precise locality in Natal: *Gerrard & McKen* 626 (NH); Tintern, *Maurice & Evans* 501 (NH); *Cooper* 1166 (K, BOL); *Gerrard* 280 (K).

O.F.S.—Without precise locality, *Cooper* 2704 (K).

CAPE.—Port St. Johns: *Hutchinson* 1778. Umzimkulu: Clydesdale, *Tyson* 2017, also at (K). Kentani: *Pegler* 1810, 1200, 605 (BOL); 2103 (BOL). Butterworth: *Hector* 993 (L). Queenstown: Gwatyn, *Galpin* 8267. Stockenström: Barker 2901 (NBG); Katberg, *Sole* 400. Komgha: *Flanagan*, 858; *Medley Wood* 5166 (SAM), East London: *Wood* 3390; *Smith* 3645; 3667; *Breyer* in Tvl. Mus. 16542; *Barker* 1415 (NBG); *Rattray* 184, rather small calyx (GRA); *Hilner* 139 (GRA); Vincent *Barker* 3512 (NBG). Stutterheim: *Rogers* 12703. Keiskama Hoek: *Story* 2500. Mkubiso Forest, *Stayner* 30 (GRA). King William's Town: *Tyson* 2150; 2887 (SAM); *Compton* 19345 (NBG); Kei Road, *Rogers* 3209 (GRA); Tamache Heights, *Leighton* 2645, 2830. Peddie: *Leighton* 2645 (BOL), near Keiskama River, *Galpin* 7691; Breakfast Vlei, *Taylor* 1715. Bedford: *Acocks* 17633; Hutton s.n. cited in Fl. Cap. under J. tortuosum (K); *Theron* 579. Victoria East: near Fort Hare, Alice, *Grand and Blenkiron* 2705; Hogsback, *Rattray* 356 (GRA). Albany: *Cooper* 2712 (K); *Rogers* 2782; Blaauwkrantz Bridge, *Galpin* 266; Fish River, *Marloth* 10869; Oaklands Park, *Galpin* 281; Botha's Hill, *Rogers* 3408 (SAM); Grahamstown, *Britten* 1560 (GRA). Port Alfred: *Tyson* in Govt. Herb. PRE. 12990; *Hutton* s.n. (GRA); Salisbury s.n. (GRA). Somerset East: Zuurberg, *Holland* 303; Compton 20276 (NBG); Boschberg, *MacOwan* 1946, 3 sheets cited in Fl. Cap. under J. tortusum (SAM); Alexandria: *Copeman* 84. Uitenhage: Sunday Riv., *Gill* s.n. (K); Aloes, *Drege* 3146; *Prior* s.n. Zwartkops River, E. & Z. s.n.; 496 (BOL); 231, cited in Fl. Cap. (K, SAM); 3372 (SAM); Addo, *Drege* b (K, L); Drege B. b (L); *Wilman* Bol. Herb. 25407 (BOL); Enon, *Thode* A 2699; A 2698; *Drege* B. a., type gathering of var. glabratum E. Mey (K, L); between Enon and Zuurberg, Drege a, (K, L). Port Elizabeth: *West* 18 (K, GRA); St. George's Strand, *Long* 852; Redhouse, *Paterson* 240 (GRA); *I. L. Drege* 113 (GRA); *Long* 853 (GRA); Algoa Bay, *Cooper* 2702 (K); Kabeljouws River, *Bolus* 1667, cited under *J. tortuosum* in Fl. Cap. (K, BOL). Ladismith: Suar Mts. *Liebenberg* 703. Without precise locality in Cape Province: *Castelnau* 462; E. & Z. s.n. (GRA); Barber 23 (GRA); E. & Z. 286 (L); Ecklon s.n. (L); E. & Z. s.n. (L); British Kaffraria, *Hutton* s.n., cited in Fl. Cap. under *J. tortuosum* (K).

Not known to occur outside South Africa.

J. angulare Vahl and *J. capense* Thb. are synonymous and since both were published during 1794, and more exact dates cannot be found for the publications, the author who first cites one of these as a synonym of the other must be followed (International Rules, Art. 67). Willdenow in 1797 cited *J. capense* as a synonym of *J. angulare*: therefore, of these two the latter, *J. angulare* Vahl, is the correct name.

With regard to the pubescence, in this species some of the plants are completely glabrous or appear glabrous with sparse pubescence in parts while others are conspicuously tomentulose. The examination of a range of material shows that the tomentulose specimens are not restricted to any particular region and that in some places both pubescent and glabrous forms occur near each other, such as two collections of Thode at Enon., A 2699 (glabrous) and A 2698 (tomentulose), and Drege B. b and b from Addo. It was found too that in some cases on the same specimen both glabrous and tomentulose twigs occurred. On this account a species or variety separated from *J. angulare* on the presence or absence of pubescence cannot be maintained. This applies to *J. natalense* Gilg & Schellb. and *J. angulare* var. *glabratum* E. Mey. Gilg and Schellenberg write of *J. angulare* var. *glabratum* E. Mey. (*vide* Bot. Jb. 51: 84, 1914) that since the type in Vahl's herbarium in Copenhagen is glabrous this variety must be dropped. Making no reference to Vahl's original description which gives the branchlets as villose, they then proceed to describe *J. natalense* (l.c. page 86) to take the distinctly pubescent specimens. Although the cited specimens from Natal and Pondoland have not been seen, judging from the description and several specimens from the same locality there can be no doubt that they are *J. angulare* in the broad sense as here defined. (The specimen cited from the Transvaal, Schlechter 11749, is *J. fluminense*).

J. angulare is characterised by the angled branchlets seen best in the glabrous specimens, the terminal rather compact cymes with fairly long pedicels to the lateral flowers, and the calyx usually 3 mm. or more long. The leaves are 3-foliolate with an occasional pinnately 5-foliolate leaf, and the leaflets are usually ovate with acarodomatia on the under surface in the axils of the lower veins. In the pinnately 5-foliolate leaves this species resembles the tropical african species, *J. goetzianum* Gilg, but in this latter species the leaves are normally pinnate and the inflorescence lateral as well as terminal. *J. angulare* has been collected among boulders on hill sides, near rivers, in scrub and scrub forest, and in coastal bush. The flowering time is from October to January.

4. **J. fluminense** *Vell.* Fl. Flumin. 10 (1825); op. cit. Atl. 1. t. 23 (1827); Dandy in Kew Bull. 1950, p. 368 (1951); Turrill in F.T.E.A. p. 19 (1952). *J. mauritianum* Boj. ex DC. Prod. 8: 310 (1844); Harv. ex Wright in Fl. Cap. 4, 1: 482 (1907). *J. schroeterianum* Schinz Verh. Bot. Brand. 30: 256 (1888).

Woody climber or scrambler, sometimes shrubby. Ultimate branchlets usually long, 10–20 cm. or more, densely shaggily pubescent to rather thinly tomentose sometimes partly glabrescent. *Leaves* 3-foliolate; petioles patently spreading with apex only upturned, 0·5–2·2 cm. long, usually densely pubescent, rarely partly glabrescent; leaflets densely to sparsely pubescent on both surfaces sometimes sub-glabrous, ovate, gradually narrowing to an acute or rounded apex, acarodomatia when present usually in axil of lower veins only, the terminal leaflets about 2·5 to 4·8 cm. long and 1·4–3 cm. broad on a petiolule 1 to 1·9 cm. long, lateral markedly smaller with petiolule 3–10 mm. long. *Inflorescence* terminal and axillary in the upper leaflets only, together forming a broad cymose panicle, branches of the inflorescence densely pubescent with crisped hairs; pedicels 1·5–6 mm. long, similarly pubescent. *Calyx* shortly campanulate, pubescent like the pedicels or sub-glabrescent, 1·5–2 mm. long with 5–6 teeth or lobes, up to 1 mm. long, oftern smaller or almost obsolete. *Corolla* white, fragrant, tube 1·5–2·5 cm. long, lobes 6–8, about 1·2 cm. long, 5 mm. broad. *Stamens* inserted in upper half; filaments about 1·5 mm. long; anthers 4·5 mm. long, acute at apex not reaching the mouth of the corolla tube. *Style* 2, lobed at apex, lobes subexserted. *Fruit* brown to shiny black when mature, globose, about 7 mm. in diameter, often twin berries developing.

PLATE 5.

Type: A specimen from Santa Cruz, Brazil, where it had been introduced and was already established in 1825. Types of synonyms: *J. mauritianum*, (specimen?), Mauritius; *J. schroeterianum Schinz*, *Schinz* s.n., South West Africa.

SOUTH WEST AFRICA.—Kaokoveld: Kunene River, *Hall* 460 (NBG). Ovamboland: Omupande, *Rautenen* 790 (K); Okavango, *van Dam* s.n. (NBG); *Lugard* 230 (GRA). Oshikango: *Loeb* 291. Caprivi Strip: *Curson* 1024. Ngamiland: *Curson* 806, 144, 343.

BECHUANALAND.—Maun: *Van Son* in Tvl. Mus. 28959; Kahako, *Schoenfelder* S138; near Kachikau, *Erens* 382.

TRANSVAAL.—Soutpansberg: Chipese, *Verdoorn* 2013; *Lam* and *Meeuse* 4894; Dongola, *Dyer* 4311; Waterpoort, *Moss* 5311 (J); Fogwells, *Smuts* and *Gillett* 3134; Mpefu, *Smuts* 2043; Maslangani, *Breyer* in Tvl. Mus. 16031; Elim, *Obermeyer* 29254; Messina, *Rogers* 18737; Griffin Mine, *Breyer* 15630. Pietersburg: Mokeetsi, *Reynolds* 113; Blaauwberg, *Smuts* and *Pole Evans* 940; *Codd* 8706; Chuniespoort, *Maguire* 22049. Piet Potgietersrust: Magalakwin River Drift, *Hutchinson* 2665. Letaba: Gravelotte, *Galpin* 13522; Selati Railway, *Rogers* in Tvl. Mus. 12985. Carolina: Waterval Onder, *Rogers* 422 (GRA). Pilgrims Rest: Newington, *Pole Evans* H. 18889. Nelspruit; Crocodilepoort, *Dyke* 5391, near Skukuza, *Letty* 46; *Johnson* 449 (NBG); *v. d. schijff* 847; Pretorius Kop, *v. d. Schijff* 4; 492; *Codd*

5085; 5655. Barberton: Kaapmuiden, *Mogg* s.n.; *Rogers* in Tvl. Mus. 24290; Boulder Siding, *Mogg* s.n.; Komatipoort, *Schlechter* 11749 (cited in original description under *J. natalense* Gilg and Schellenb.); *Leendertz* in Tvl. Mus. 2601; *Rogers* in Tvl. Mus. 2601; 19352; *Rogers* 22202; 2677 (GRA); Komati Falls, *Burtt Davy* 360, cited in Fl. Cap. under *J. angulare*, (K); Lomati River, *Jenkins* in Tvl. Mus. 9919; Crocodile River Drift, *Bolus* 7848, cited in Fl. Cap. (BOL); Highlands Creek, *Moss* 10702.

SWAZILAND.—Mbabane: near Bremersdorp, *Compton* 19726 (NBG). Asoko: *Dohse* 210.

NATAL.—Ingwavuma: *Gerstner* 4002 (NH); *Codd* 2082; *Ward* 2003.

Also occurs northwards to Nigeria, Abyssinia and Eritrea, in Mauritius, the Seychelles and Arabia; naturalised in the West Indies and S. America.

Until quite recently this species was generally known in Africa, Asia and the Mascarenes as *J. mauritianum* Boj. In the Kew Bulletin 1950 (published 1951) Dandy pointed out that this name is antedated by *J. fluminense* which Velloso had described in 1825. His specimen was from Brazil where the tropical African species had established itself.

This species, which is so common and widely distributed in Africa, is recognised by the following combination of characters: petioles patently spreading with the apex only upturned; petiolules of lateral leaflets 3–10 mm. long, of terminal longer; acarodomatia, if present, in axils of basal or lower veins only; inflorescence terminal and in axils of upper leaves, often forming a broad, more or less flat-topped cymose panicle; pedicels comparatively short and the calyx tube small, under 2 mm. long, with short or almost obsolete teeth. On the whole the pubescence is fairly characteristic being rather dense and of crisped hairs covering even, or especially, the branches of the inflorescence, but this character can be misleading as some specimens, especially in the eastern regions, are glabrescent and occasionally a specimen of *J. angulare* is found with a similar pubescence.

These two species, *J. fluminense* and *J. angulare*, are closely related and are best distinguished from each other by the very small calyx of *J. fluminense*, usually not over 2 mm. long, its broad inflorescence borne clear of the leaves, and short pedicels. The distribution is distinct, *J. fluminense* being a tropical species reaching only as far south as the north-eastern Transvaal and northern Zululand (Ingwavuma) whereas *J. angulare* occurs commonly in the Cape and as far North as Volksrust in the Transvaal and Utrecht in Natal. Evidently Gilg and Schellenberg confused these species because, when describing *J. natalense* (the pubescent form of *J. angulare*, see note under that species) in the Jahrbucher 1914 they cited also Schlechter 11749 from Komati Poort which is definitely *J. fluminense*. In the same way Wright in the Flora Capensis cited Burtt Davy 360 from Komatipoort under *J. angulare* and it too is *J. fluminense*.

Turrill in the Flora of Tropical East Africa, page 21 (1952), divides *J. fluminense* into subspecies and varieties. It has not been found possible in practise to uphold these. From the description, *J. schroeterianum* Schinz is also a synonym of *J. fluminense*. This is supported by a specimen named "*J. schroeterianum* = *J. mauritianum*", at Kew, *Rautanen* 790, which is obviously *J. fluminense* as here defined. With regard to the affinity of *J. fluminense* with another tropical species, *J. abyssinicum*, see the notes under this latter species.

In South Africa, *J. fluminense* is found along rivers or in watercourses in dry country, scrambling over small bushes or climbing in trees on wooded slopes in the lowveld.

5. **J. abyssinicum** (*Hochst.* ex) *DC.*, Prodr. 8: 311 (1844); Bak. in Fl. Trop. Afr. 4: 11 (1902); Gilg & Schellenb. in Bot. Jb. 51: 84 (1913); Turrill in F. T. E. A. 18 (1952). *J. wyliei* N.E. Br. in Kew Bull. 1909 p. 419.

Shrub, usually with profuse and high climbing branches, ultimate branchlets long, terete, ascending. *Leaves* 3-foliolate; petioles patently spreading with apex only ascending, 1·5–3·3 cm. long; petiolules of lateral leaflets 1–6 mm. long, of the terminal 10–20 mm. long; leaflets broadly ovate to orbicular-ovate, often shortly acuminate at the apex, the terminal usually 2·5–7·5 cm. long and 2–4·5 cm. broad, glabrous (in South African specimens), acarodomatia, when present, in axils of central and upper as well as basal veins on the lower surface. *Inflorescence* terminal and lateral in the axils of the leaves, cymose-paniculate, lax (in South African specimens), the branches minutely puberulous; pedicels varying in length on the same inflorescence, from 4 mm. (in terminal flowers) to 15 mm. (on lateral flowers), puberulous. *Calyx* campanulate, puberulous, about 3 mm. long, shortly 5–6-toothed; teeth ·5–1 mm. long with wide sinuses between. *Corolla* white, suffused reddish purple without; tube about 2·2 cm. long; lobes 5–6, about 1 cm. long and 6 mm. broad. *Stamens* inserted in upper half of the corolla tube; filaments 1·5 mm. long; anthers included 5 mm. long, apiculate, apicule about 1 mm. long. *Ovary* sub-quadrate, about 1·5 mm. long and broad; style long, terete; stigma 2-lobed, lobes oblong subcylindrical in outline, about 4 mm. long. *Fruit* a twin berry, one often aborting, subglobose, about 1 cm. diam.

PLATE 6.

Type.—*Schimper* 169, Aduwa, Abyssinia. Type of synonym: *J. wyliei* N.E. Br., *Wylie* in Herb. Medley Wood 8860, Nkandhla, Natal.

TRANSVAAL.—Zoutpansberg: Entabini Forest near Louis Trichardt, *Galpin* 9679 (fruiting specimen). Pilgrimsrest: Marieps Kop, *Marsh* s.n.

NATAL.—Nkandhla, *Medley Wood* 8860 (type number of *J. wyliei* N.E. Br.).

Also occurs northwards to Abyssinia and Uganda.

Among the specimens in South African herbaria there are no less than 6 sheets of Medley Wood Herb. No. 8860, the type number of *J. wyliei* N.E. Br. These all agree with the description of *J. abyssinicum* as given by Turrill in his revision of the Oleaceae (Fl. Trop. East Africa, 1952) and compare with several specimens from tropical Africa so named in the National Herbarium. Following Turrill's identification of these tropical African specimens, *J. wyliei* N.E. Br. goes into synonymy. The gap in the distribution can probably be explained by the lack of any extensive collecting in the intervening high forests. This was to some extent proved to be so when, after being requested, an Officer of the Department of Forestry, searching for this species, found it in the forest at Marieps Kop in the north-eastern Transvaal. The material was sent to the National Herbarium in April, 1954 and the specimen is cited above. This material assisted in confirming the tentative identification of a fruiting specimen from a forest near Louis Trichardt, *Galpin* 9679, as belonging to the same species and so another link in the distribution is provided.

J. abyssinicum is usually found in high forest. It is closely related to *J. fluminense*, from which it can be distinguished principally by the slightly larger calyx and the axillary as well as terminal inflorescences. In the South African specimens it can also be distinguished by the usually rather larger leaves which are thinner in texture and glabrous, and the acarodomatia which, when present, occur in the axils of upper as well as basal veins. One or other of these features may occasionally be found in eastern forms of *J. fluminense*, but then the size of the calyx will be decisive, or the shape of the inflorescence, which is more or less flat-topped in *J. fluminense* and rather oval in outline in *J. abyssinicum* (compare plates 5 and 6).

6. **Jasminum breviflorum** *Harv.* in Wright in Fl. Cap. 4, 1: 480 (1906). *J. gerrardi* Harv. in Wright l.c. (glabrous variant).

Climber, usually rampant, occasionally shrubby. *Twigs* densely or sparsely pubescent with patent crisped hairs or short stiff hairs, glabrescent. *Leaves* simple, variable in shape and size, lanceolate-oblong, lanceolate-ovate, ovate to ovate-suborbicular, up to 4·5 cm. long and 2·5 cm. broad, usually smaller, pubescent on both surfaces, especially along the veins beneath, glabrescent in parts, sometimes glabrous; petiole short, up to 3 mm. long, pubescent, articulated at or above the middle, often at the apex, articulation not obvious. *Inflorescence* terminal on the twigs, usually 3-flowered and often also with solitary flowers in the axils of the upper pair of leaves; pedicels long, up to 1·5 cm. long, densely or thinly pubescent to glabrous. *Calyx* thinly pubescent, rarely densely, sometimes glabrescent; tube about 3 cm. long; lobes usually 5, very shallow (calyx appearing truncate), or up to 2 cm. long and thickened and conduplicate, usually with recurved apicule but not produced into a subulate erect apical portion. *Corolla* white, fragrant, tube 1·5–2 cm. long (in eastern Cape up to 3 cm. long); lobes about 7, usually 1–2 cm. long and 2·5–5 mm. broad. *Stamens* 2, inserted on the tube in upper half, included, filaments very short; anthers about 3·5 mm. long. *Ovary* about 1 mm. long, truncate, 2-celled with 1 ovule in each; style filiform 1·5 cm. long; stigma lobes 3·5 mm. long, exserted. *Fruit* a twin berry but usually only one developing, sub-globose, about the size of a large pea turning black when ripe; seed 1, exendospermous.

PLATE 7.

Type: *Burke* s.n., Magaliesberg, near Pretoria. Type of synonym: *J. gerrardi* Harv., *Gerrard* 1477, Nonoti Riv., Mapumula, Natal.

TRANSVAAL.—Waterberg: near Naboomspruit, *Galpin* 494 M.; near Nylstroom, *Repton* 3481; Bremekamp & Schweickerdt 2; Middelfontein Station, *Galpin* 13989; *Mogg* 17557; Warmbaths, *Leendertz* 6542; near Warmbaths, *Bolus* 12113; Burtt Davy 2182; Thode A1729; N.E. of Thabazimbi, *Codd* 4793. Rustenburg: Nation 346 (BOL); Zwartruggens, *Sutton* 809; near Rustenburg, *Hutchinson* 2933; Buffelspoort, *Turner* 39; Assen, *van Nouhuys* in Tvl. Mus. 31046. Brits: Welgevonden, *Mogg* s.n., Beestkraal, *Jenkins* in Tvl. Mus. 6943. Pretoria: Magaliesberg, *Burke* s.n., holotype (K); Hartebeespoort Nek, *Prosser* 1578; Hamanskraal, *Repton* 3544.

NATAL.—Without precise locality, *Buchanan* 17 (SAM). Dundee: Vants Drift, *Codd* 1517? poor. Msinga: Tugela Ferry, *Galpin* 14789; *Dyer* 4381 poor. Babanango: between Babanango and Entonjaneni, Umhlatuzi Bridge, *Lawn* 2040 (NH). Greytown: Muden Valley, *Galpin* 14737. Eshowe: Nkwaleni Valley, *Lawn* 362 (NH). Mtunzini, near Mtunzini, *Lawn* 1631 (NH). Mapumula: Nonoti, *Gerrard* 1477, holotype (K); *Gerrard & McKen* 1477 (NH). Camperdown: *Rehmann* 7706 (K); *Acocks* 10855; Umlaas Drift, *Medley Wood* 1827, cited in Fl. Cap. under J. streptopus (NH). Maritzburg: *Rajah* 4 (NH); nr. Maritzburg on Durban Road, *Compton* 4417 (NBG). Umzinto: Dumisa, St. Mcihael, *Rudatis* 2123 (NH).

CAPE.—Tembuland, on the Kei River, *Bolus* 25405 (BOL). Butterworth: Kei Bridge, *Flanagan* 1204, 1205. Queenstown: Junction Farm, *Galpin* 8145; *Spence* in Galpin Herb. 8038. King William's Town: *Galpin* 5912; 5913 (GRA); *Sim* 2724; *Tyson* 2232. Peddie: Keiskamma River, *Sim* 6281; Kaffir Drift, *Compton* 17824 (NBG).

Also found in Portuguese East Africa and may occur in other territories north of South Africa.

Harvey's species, *J. gerrardii* and *J. breviflorum*, were published posthumously by C. H. Wright in the Flora Capensis at the same time, the former from Natal and the latter from the Transvaal. They were classed together on the simple leaves and the short to almost no calyx lobes, and distinguished from one another by the glabrous twigs and leaves of *J. gerrardii*, as opposed to the very pubescent ones of *J. breviflorum*. According to the description these features seemed to be supported by the shape of

the leaf which was described as " ovate-lanceolate, acute at each end ", in the Natal species and " ovate, obtuse or acute " in the Transvaal species. An examination of a number of specimens from the Transvaal, Natal and the eastern Cape showed (1) that both leaf-shapes could be found among pubescent specimens as well as among glabrous specimens; (2) although the glabrous specimens mostly came from Natal, their habitat was not different from the pubescent form in that Province; and (3) that no constant supporting feature to that of pubescence could be found. It was also found that some specimens from the eastern Cape were pubescent in part only while on a Flanagan specimen one unattached branch is glabrous and the other pubescent. These species can therefore not both be upheld, not even with one as a sub-species or variety of the other. Since they were published at the same time and, as far as can be ascertained, neither has been sunk before, *J. gerrardii* is here sunk under *J. breviflorum*. The choice of the name to be retained, although it is second in order on the page in Flora Capensis, was made because the pubescent varient, *J. breviflorum*, is by far the more common and widely spread.

As the name implies, the flowers are shorter in this species than in most others, but it is not a reliable character since several specimens from the eastern Cape have long flowers. Whether this is a regional variation or whether there is hybridization with the long-flowered eastern Cape species, *J. angulare*, is not known. In spite of the variations, these specimens with the almost truncate to shortly lobed calyces form a recognisable group. The calyx-lobes when present are rather thickened and conduplicate and usually have a recurved apicule, but are never produced into an erect subulate apical portion. The petiole is short and articulate in the upper half.

From description the nearest ralative in tropical Africa would be *J. stolzeanum* Knobl. and our species should be compared with it to ascertain the differences. If they are not distinct *J. breviflorum* Harv. in C.H. Wr. takes priority over *J. stolzeanum* Knobl. (1936).

7. **J. glaucum** (*L.f.*) Ait. Hort. Kew. ed. 1, 1: 9 (1789); Harvey ex Wright in Fl. Cap. 4, 1: 480 (1906), in part, excl. var. parvifolium E. Mey, and citations from eastern Cape, Natal and Transvaal. *Nyctanthes glauca* Linn. f. *Suppl.* 82 (1781); *J. ligustrifolium* Lam. Encycl. 3: 218 (1789); *J. glaucum* var. *lanceolatum* et var. *latifolium* E. Mey. Comm. 1, 2: 13 (1837); DC. in Prod. 8: 305 (1844); Harv. ex Wright in Fl. Cap. 4, 1: 481 (1906).

Shrubs rarely scandant, glabrous in all parts. *Leaves* simple, glaucous, usually about 3 times as long as broad, lanceolate, lanceolate-elliptic, lanceolate-ovate, slightly narrowed to a rounded mucronate apex, or acute, sometimes long acuminate, 3–6·5 cm. long, ·7–2·5 cm. broad, narrowing gradually to the 3- (or more) nerved base and then abruptly narrowed into a petiolule like basal portion; petiole short, 1–5 mm. long but with the cuneate leaf-base appearing about 1 cm. long, articulate at the apex but articulation often appearing to be about midway depending on the length of the leaf-base. *Inflorescence* terminal on ultimate branchlets, occasionally also in axils of upper pair of leaves, normally 3-flowered; bracts setaceous, usually about 1 cm. long; pedicels 3–12 mm. long. *Calyx* with usually 5–7 subulate lobes; lobes as long as or longer than the tube, sinuses rounded. *Corolla* white, fragrant; tube usually 2–2·5 cm. long; lobes 6–8 in number, 1·7–2·5 cm. long, up to 5 mm. broad. *Fruit* black, a twin berry, one often aborted.

PLATE 8.

Type: *Thunberg*, Langekloof, Caledon*. Types of synonyms: *J. ligustrifolium* Lam. Cape of Good Hope, without precise locality; *J. glaucum* var. *lanceolatum* E. Mey. *Drege*, Olifants Riv., Van Rhynsdorp; var. *latifolium* E. Mey. *Drege*, Clanwilliam.

* Photograph of type in Uppsala herbarium seen since going to press.

CAPE.—Van Rhynsdorp: Ebenezer, *Drege* s.n., cited in Fl. Cap. under " var. lanceolatum E. Mey.". Clanwilliam: *Drege* s.n. " var. latifolium " (L); 6 miles N.W. of Clanwilliam, *Leipoldt* s.n.; 4451 (BOL); 1 mile N. of Keerom, *Pillans* 8675; near Hex River; *Compton* 18837 (NBG); Pakhuis Pass *Middlemost* s.n. (NBG); beyond Pakhuis Village, *Compton* 4752 (NBG); near Olifantsriver, *Zeyher* s.n. (BOL); Krakadouw Poort, *Esterhuizen* 12269 (BOL). Piquetberg: Piqueniers Kloof, *Dickson* in herb. Bolus 5699 (BOL). Tulbagh (or Worcester?): Witsenberg, *E. & Z.* s.n. (77. 10); Tulbaghkloof, *Zeyher* 1149 (K, PRE). Worcester: Hex River, *Leighton* 2379 (BOL); *Pillans* 5271 (BOL). Paarl: Gt. Drakenstein Mts., *Esterhuizen* 9526; *Wasserfall* 721 (NBG). Caledon: Witwater, *Baur* 8742.

The distribution is limited to the south-western Cape.

It is obvious that this species as treated in the Flora Capensis is a mixture of *J. glaucum* and *J. multipartitum*. The specimens cited there from the south-western Cape, that is from the Tulbagh, Van Rhynsdorp and Clanwilliam districts, answer best to the original description of *J. glaucum* (L. f.) Ait. and form a group easily distinguished from the rest. The group is characterised by the wholly glabrous plants, the glaucous leaves which are usually about 3 times as long as broad, mostly lanceolate-oblong to lanceolate-ovate in shape, and the normally 3-flowered inflorescences.

Among the other specimens cited in the Flora Capensis, that is those from outside the winter rainfall area, Krauss 458 is the type number of *J. multipartitum* Hochst., the very next species described in that work, and *Cooper* 378 and *Galpin* 266 are also *J. multipartitum* Hochst. The other two specimens cited have not been seen, namely Burchell 3657 and Wilms 925, but, judging from the localities where they were collected they too are in all probability *J. multipartitum*.

The collector's notes, on the herbarium specimens examined, are very meagre; not one mentions the habit of the plant or the glaucous leaves. Thunberg, the collector of the type specimen, is quoted by Lindley in the Botanical Register t. 2013 (1837) as saying that it, meaning *J. glaucum*, is " as high as a man in Lange Kloof (Caledon) by the great stream called Zonder End and in the neighbourhood of the Brederiver ". The plate, however, does not convincingly depict *J. glaucum*. It seems rather to be one of the rare 3-flowered specimens of *J. multipartitum*.

8. **J. multipartitum** *Hochst.* in Flora 27, 2: 825 (1844); De Wildeman, Ic. Sel. Hort. Hen. 4 t. 134 (1903); Wood and Evans in Natal Plants 4, Pl. 328 (1906); Harv. ex Wright in Fl. Cap. 4, 1: 480 (1906); *J. glaucum* Harv. ex Wright l.c. pro parte, non Ait.; *J. glaucum* var. *parvifolium* E. Mey. Comm. 1, 2: 173 (1837); DC. Prodr. 8: 305 (1844).

Shrub 18 inches to 9 feet tall, sometimes scandent, twiggy. *Twigs* puberulous, usually short about 2 cm. long. *Leaves* simple, usually glabrous, suberect, shining, green, often drying blackish and brittle, very variable in size and shape, sometimes aborted or very small on the flowering twigs, oblong, ovate-oblong or ovate-lanceolate, 1·5–3·5 cm. long (usually about 2·5 cm. long) 4–28 mm. broad (usually about 9 mm. broad), rounded or sometimes acuminate and acute at apex, rounded at base and abruptly narrowed into a petiolule-like base; petiole glabrous or minutely puberulous, appearing articulated in the centre or above or below, 1–5 mm. long. *Inflorescence* terminal on short lateral twigs, usually 1-flowered, rarely 3-flowered; pedicels shorter than the calyx, 1–5 mm. long, glabrous or rarely minutely puberulous. *Calyx* glabrous or rarely minutely puberulous in parts; tube 2–3 mm. long; lobes 5–9, margins inrolled, appearing subulate with wide sinuses between them, 3–5 mm. long sometimes minutely puberulous at least on margins. *Corolla* white, pink flushed or lobes dorsally brick red, fragrant; tube 2–3 cm. long; lobes about 11, more or less 1·7 cm. long

and 4 mm. broad. *Stamens* inserted on tube in upper half, included; filaments 1·5 mm. long; anthers 3·5 mm. long, apiculate. *Ovary* 2 mm. long quadrate, truncate; style 2-lobed at apex, eventually exserted, lobes oblong about 2 mm. long. *Fruit* a twin berry joined at base only, but often only one-half developing, oblong to oblong-globose, slightly compressed, about 1–1·5 cm. long, 8–10 mm. broad and 4 mm. thick, green, shiny, turning black when ripe.

PLATE 9.

Type: *Krauss* 458, near the bay, Durban, Natal. Type of synonym: *J. glaucum* var. *parvifolium* E. Mey., *Drege*, Bothasberg, Albany.

TRANSVAAL.—Pietersburg: near Boyne, *Gerstner* 5345 (poor specimen). Potgietersrust: *Leendertz* 6595; 7406; Makapan Valley, B.M. in Moss Herb 22664 (J). Waterberg: Naauwpoort, *Galpin* 133133; Naboomspruit, *Galpin* 13988; near Nylstroom, Story 1540; Krantzberg, *Prosser* 1713; near Warmbaths, *Sidey* 1343; Marais 551, 552, 553; near Rooiberg, Sandspruit, *Forssman* 262. Lydenburg: Sekukuniland, *Barnard* 147; Parys, *Barnard* and *Mogg* 756. Pilgrimsrest; Bushbuckridge, *Forest Officer* 28; Branddraai, *Young* A641. Nelspruit: *Breyer* 18001; Pretorius Kop, *Codd* 6173; *v. d. Schijff*, 961; Shabin, *v. d. Schijff* 670; Clobe, *v. d. Schijff* 1171; Near Nelspruit, *Liebenberg* 2632; Plaston, *Holt* 92; White River, *Rogers* in Tvl. Mus. 20528; *Rogers* 2348 (GRA).

SWAZILAND.—*Stewart* 8851; Lebombos, 25 m. S. of Stegi, *Hornby* 2819.

NATAL.—Without precise locality, Kate Saunders in Bol. Herb. 25402 (BOL); Medley Wood 356 (BOL). Nongoma: Mkusi River Valley, 5 m. N.E. Mkuzi, *Codd* 2058. Hlabisa: St. Lucia, *Lansdell* in N.H. 37644 (NH); Lower Umfolosi: 11 m. S.W. of Empageni, *Codd* 1879. Nqutu: Amangi Valley, native for *F. Bayer* in NH. 21766 (NH). Babanango: Umhlatuzi Valley, Melmoth Road, *Lawn* 939; 1280, 1890 (NH). Mtunzini: *Lawn* 1777 (NH); Ginginhlova, *Galpin* 133129; *Lawn* 1199; 1200 (NH); Myrlyn, Inyoni, *Johnson* 478. Umvoti: Rietvlei, Craigie Burn, *Fry* in herb Galpin 2751. Weenen: *Pentz* 539; *West* 1157; Sandspruit, *Acocks* 10560. Estcourt: near Muden, *Repton* 1192; Research Station, *West* 418; Mooi River Valley, *Sutherland* s.n. Pietermaritzburg: *Killick and Marais* 1999; Table Mountain, *Bond* 1250 (NBG); Durban Road, *Barker* 442 (NBG); Albert Falls, *Comins* 498; Tugela River, *Gerrard* 264 (NH). Camperdown: Cato Ridge, *McClean and Ogilvie* in NH. 27921 (NH). Durban: *Medley Wood* 94 (SAM); 12411; s.n.; *Marloth* 4176; woods near Durban Bay, *Krauss* 458, type number (K); Berea, *Medley Wood* 150 (GRA); Clairmont, *Medley Wood* 11195 (NH); "Claremont", *Schlechter* 2951; Umhlanga, *Medley Wood* 10520 (NH); Springfield, Indian in NH. 17818 (NH); Bellair, *Lansdell* in NH. 34288 (NH). Umzinto: Umkomaas, *Tyson* 2666 (SAM); Drift Halt, *Lansdell* in NH. 34710 (NH).

CAPE.—Pondoland, without more precise locality, *Bachmann* 1030 (K). Bizana: *Bruce* 441; Mount Ayliff, *Story* 567. Port St. Johns: *Edwards* in Moss Herb. 8427 (J); Umtata: Umtata River near falls, *Schonland* 3775 (GRA); Kentani: near Kentani, *Pegler* 1253 (NBG). Komgha: near Komgha, *Flanagan* 59; 479; Kei Mouth, *Compton* 17685 (NBG). Queenstown: Gwatyn, *Galpin* 8266. East London: *John Wood* 3372 (poor); King William's Town: Pirie Forest, Muden Dam, *Acocks* 9290; Buffalo River Valley, *Galpin* 5912; Keiskama Hoek, *Cooper* 378 (BOL). Stockenström: Katberg, *Sole* 401; Fort Armstrong, *Martin* 158 (NBG). Elands River, *Scully* 84 (SAM). Victoria East: near Kweza Siding, *Acocks* 1115; near Alice, *Gillett* 4588; *Hutch and Dyer* 1688; *Dyer* 1796 (GRA); Barker 1414 (NBG). Peddie: Kafir Drift, *Compton* 17819 (NBG). Albany: between Blaauwkrantz and Kowie Poort, *Burchell* 3657, cited under J. glaucum in Fl. Cap. (K). Koonap Heights, *Dyer* 724; Alicedale, *Cruden* 143 (GRA); Plutos Vale *Barker* 2810 (NBG); Blaauwkrantz Bridge, *Galpin* 266 (GRA); Blaauwkrantz, *Hutchinson* 1569; Fish River Heights,

Hutton s.n. (K) and in Bolus Herb. 2540 (BOL); Fish River Valley, *Lotsy and Goddyn* 6 (L); Fort Brown, *Lotsy* and *Goddyn* 727 (L). Bathurst: Trapps Valley, *Daly* 626 (GRA). Somerset East: Zuurberg, *Compton* 20256 (NBG). Uitenhage: near Uitenhage, *Prior* s.n.; Thode A678 (NH); *West* 19 (GRA); Enon, *Thode* A1108; A2697; A678; Sand Fontein, *Burke* s.n. (K).

Also occurs in Portuguese East Africa and possibly in Southern Rhodesia.

In South Africa this species has quite a wide distribution and it is often found cultivated in gardens. It occurs frequently in the Waterberg district of the Transvaal, and from there eastwards to Swaziland, Natal and eastern Cape as far as the Uitenhage district. It is characterised by the usually single flower on a rather short pedicel (under 1 cm. long) at the end of short slender lateral twigs which are characteristically shortly and densely puberulous. The leaves on these twigs are usually young or stunted, smaller than those on the sterile branches and they frequently dry black and brittle giving the herbarium specimens a characteristic appearance. The sweetly scented flowers have very white radiating corolla lobes which are dorsally, wine-coloured or maroon, the buds and corolla tube being the same maroon colour.

In the Flora Capensis this species is partly confused with *J. glaucum* Aiton (see notes under that species), and the type number of *J. multipartitum*, Krauss 458, is cited under the latter species; on the other hand Burchell 3657 (K) is wrongly cited under J. glaucum. When correctly delimited, these species are clearly distinct. Not so clear is the difference between some of the northern specimens of *J. multipartitum* and some of *J. stenolobum* Rolfe. The main difference between these species is the obvious pubescence of *J. stenolobum* and the less conspicuous but characteristic short dense pubescence of *J. multipartitum*. In some of the Transvaal specimens where the distribution of the two species overlap there may, when material is not adequate, be some difficulty in distinguishing these species (see notes under *J. stenolobum*).

Specimens from Rhodesia and Portuguese East Africa which, except for the inflorescences being more often 3-flowered, fit into *J. multipartitum* as treated here, fall into the broad concept of *J. meyeri-johannes* Engl. as given in the Flora of Tropical East Africa (1952). In my opinion they should be classified as *J. multipartitum* Hochst., which seems to be distinct from the tropical species, judging from some of the specimens seen. If not distinct, *J. multipartitum* is the older name and would have to stand.

9. **J. stenolobum** *Rolfe* in Oates, Matabele Land, ed. 2: 403 (1889) Baker in Fl. Trop. Afr. 4, 1: 4 (1902); Harv. ex Wright in Fl. Cap. 4, 1: 481 (1907); Gilg & Schellenb. Bot. Jb. 51: 91 (1913); Turrill in F.T.E.A.: 24 (1952).

A bushy or straggling shrub, sometimes scrambling or climbing. *Branches* terete, pubescent, glabrescent; ultimate twigs 1–5 cm. long, rarely longer, densely or persistently pubescent to tomentulose with spreading or reflexed hairs. *Leaves* very variable in size and shape, from ovate-lanceolate or elliptic to ovate or ovate-oblong, usually 1–4 cm. long and 0·4–1·8 cm. broad, pubescent on both surfaces, without acarodomatia; petioles pubescent, 3–8 mm. long articulated near the base (rarely higher up). *Inflorescence* terminal on the short ultimate twigs, usually 1-flowered (occasionally 2–3-flowered); pedicels pubescent, usually short, 1–7 mm. long, occasionally up to 1 cm. long. *Calyx* pubescent, pubescence variable, hairs short or long and curly; tube 2–3 mm. long; lobes 6–13, subulate with U-shaped sinuses, 2·5–6 mm. long. *Corolla* white (buds red, *fide* Comins), fragrant; tube 2–2·5 cm. long; lobes 7–12, 1·3–1·7 cm. long, 3–5 mm. broad. *Stamens* inserted in upper half of the tube, included, anthers up to 5 mm. long, apiculate. *Ovary* sub-quadrate, compressed, about 2 × 1·5 mm.; style 2-lobed at apex. *Fruit* a twin berry (one sometimes aborting), narrowly oblong, black, those seen about 1 cm. long and 6 mm. broad.

PLATE 10.

Type: *Oates*, Matabeleland, without more precise locality.

BECHUANALAND PROTECTORATE.—Kazungula, *Miller* B155; B383. Chobe, *Miller* B1121. Ngamiland, *Curson* 209; 210; 219.

TRANSVAAL.—Soutpansberg: N.W. of Soutpan, *Obermeyer, Schweickerdt and Verdoorn* 92; Wyllies Poort, *Pole Evans* 1783; Punda Maria, *Lang* in Tvl. Mus. 32108; 32139; Baiandbai, *Lang* in Tvl. Mus. 32264; Dzundweni Hill, *Codd and Dyer* 4601. Pietersburg: Leipsig, Blaauwberg, *Bremekamp and Schweickerdt* 60; Chunies Poort, *Pole Evans* H. 19446. P.P. Rust; *Crawley* s.n. (or in Tvl. Mus. 7159); Swerwerskraal, *Rowland* 119; 126. Waterberg: Nylstroom, *van Dam* in Tvl. Mus. 20750. Middelburg: Middelburg, *Rogers* 24864. Lydenburg: Ohrigstad–Branddraai Rd., *Young* A 608; A 609; Waterfall, *Codd and Verdoorn* 7611; Nelspruit: Sigaas, K.N.P., *van der Schijff* 1302. Barberton: *Rogers* 24879; *Thorncroft* 4964; Berea Ridge, *Galpin* 621.

NATAL.—Entonjaneni: N. of Nkwaleni, *Codd* 1840. New Hanover: Albert Falls, *Comins* 497. Mzinto: Umpanpanyoni, *Rudatis* 2010.

Also occurs in Portuguese East Africa, the Rhodesias, Nyasaland and Tanganyika.

In South Africa *J. stenolobum* is most like *J. multipartitum* from which it is mainly distinguished by the conspicuous pubescence on the twigs, leaves and calyx. The pubescence is mostly rather dense, tomentulous, with spreading or recurved, often crisped, hairs which vary somewhat in density and length. *J. multipartitum* on the other hand appears to be glabrous but is persistently, minutely and densely, puberulous, at least on the twigs. Between these species it is not a matter of one being glabrous and the other not, but a matter of a different type of pubescence and that, in my opinion, justifies upholding the two species, which in many other respects are so very similar. Both bear solitary flowers (or occasionally more) at the apex of short lateral twigs, on comparatively short and stout pedicels. The calyx lobes are usually definitely longer than the tube, the petioles are conspicuously articulate, and the leaves have no acarodomatia in the axils of the veins below. The leaves of *J. multipartitum* are extremely soft, the young ones shiny in the sun whereas in *J. stenolobum* the leaves are usually so pubescent that they give a different impression. From collector's notes it is impossible to discover whether the flowers of *J. stenolobum* have the dorsal face of the lobes and the tube a maroon colour as in *J. multipartitum*.

The areas of distribution of the two species overlap in the Transvaal and Natal and from these regions, at certain stages of growth and when the specimen is inadequate, it may be difficult to decide to which of the two a specimen belongs, but on the whole they are very easily distinguished. It has not been found, to date, that *J. multipartitum* occurs in the Kalahari sand veld such as in Bechuanaland, Ngamiland, Matabeleland, the Soutpansberg region and so forth, where *J. stenolobum* is frequent, and in the same way the latter species has never been found in the eastern Cape where *J. multipartitum* abounds.

Outside South Africa, in the more tropical regions, *J. stenolobum* has a tendency to scramble or climb more freely and to bear more than one flower in an inflorescence.

The legend on a specimen from Cloma, Northern Rhodesia, reads: "Berries brown, produce state of coma when swallowed and inability to swallow".

10. **J. streptopus** *E. Mey.* aggregate species.

(*a*) var. **streptopus.**

(*b*) var. **transvaalense** (*Sp. Moore*) *Verdoorn* stat. nov.

Climbing or scrambling shrub; branchlets often slender, pubescent, hairs of different lengths, appressed or patent, straight or crisped. *Leaves* simple, rather thin, oblong-elliptic, ovate-oblong or ovate acuminate, 1·5–7 cm. long and ·8–3 cm. broad, rounded or acute at the apex, mucronate, pubescent on both surfaces, especially along the midrib, forming a fringe on each side of it, usually with acarodomatia on the lower

surface in the axils of the lateral veins; petioles pubescent, short, 1–4 mm. long, rarely 5 mm. long, obscurely articulate near the apex and somewhat twisted. *Inflorescence* terminal on ultimate branchlets, 1–5-flowered, often 4-flowered. *Pedicels* thinly pubescent with crisped or patent hairs, glabrescent, usually 5–20 mm. long. *Calyx* pilose, glabrescent; tube 1–2·5 mm. long; lobes 4–7, subulate from a triangular base, subulate portion varying in length (with age of flower?), sometimes very short 1·5–7 mm. long. *Corolla* white, fragrant; tube slender 2–3 cm. long; lobes 6–8, about 1·6 cm. long and 3 mm. broad. *Fruit* a twin berry often one only developing, globose, brownish to black, about 7 mm. diam.

PLATES 11 and 12.

The species is characterised by a combination of the following features: Crisped pubescence on the twigs; rather short petioles articulated near the apex; acarodomatia on lower surface of leaves usually in axils of upper as well as basal veins; comparatively long slender pedicels; calyx lobes subulate from a triangular base, the subulate portion varying in length (very short or up to 7 mm. long), sometimes on the same specimen. The character which evidently gives the species its name, the slightly twisted petiole, is not restricted to *J. streptopus* but may be found to some extent in almost all the species.

The calyx lobes in this species call for some special mention. In the South African species already dealt with these lobes are either short and thick or clearly subulate. In *J. streptopus*, and some tropical species like it, there seems to be a combination of the two types of calyx lobes, the basal portion being fairly short and thick and produced at the apex into an erect subulate portion. This subulate portion varies considerably in length sometimes on the same species. It has been suggested that on young flowers the subulate portion is absent or short and elongates with the age of the flower. While this is borne out in some specimens it is not always the case and the variation seems to occur haphazardly.

The South African specimens of this species fall into two groups which are here given varietal rank and are described below. It is probable that some of the closely related species in tropical Africa are also no more than varieties of the species. Mention is made of two of these tropical species, one under each of the varieties below.

This is an example, as pointed out in the introduction, of the authority for an E. Meyer species being given as "E. Mey. ex DC." whereas E. Meyer described it in his "Commentariorum" in 1837.

(*a*). var. **streptopus;** *J. streptopus* E. Mey. Comm. 1, fasc. 2: 173 (1837); DC. Prod. 8: 307 (1844); Wood & Evans in Natal Plants 1, tab. 50 (1899); Harv. ex Wright in Fl. Cap. 4, 1: 481 (1907).

Type: *Drege*, "margin of woods near Port Natal".

NATAL.—Durban: *Medley Wood* 900 (NH); 10113 (NH); *Schlechter* 2967 (GRA); Berea, *Medley Wood* 3786 (NH); Stella Wood, *Lavoipierre* 95; 96; N.E. of Waterfall, *Dohse* 81. Inanda: *Medley Wood* 1191, cited in Fl. Cap.

Probably also occurs in Southern Rhodesia and Portuguese East Africa.

The typical variety (see plate 11) is characterised by the pubescent, oblong-elliptic to ovate-oblong leaves, mostly 4–7 cm. long and 1·6–3 cm. broad, and the 3–5-flowered, often 4-flowered, inflorescences, terminal on the ultimate branchlets. From the material examined it would seem that it is very localised for all the S. African specimens seen come from the Durban area. Outside South Africa a couple of specimens from Umtali and one from Portuguese East Africa may prove to be this variety. On the other hand they may belong to the closely related *J. pauciflorum* Bth. which differs in having the inflorescences in the axils of the lateral leaves as well as terminal. The above specimens may be merely portions of the plant where the lateral inflorescences are not present. On the other hand it is possible that the lateral inflorescence is not a specific character

and that *J. pauciflorum* is no more than another variety of *J. streptopus*, with the tendency for the inflorescence to be axillary as well as terminal. Further study of tropical specimens should settle this point and may show that a few more closely related species in those regions are no more than varieties of *J. streptopus*, which is the oldest described species in this group.

(*b*). var. **transvaalense** (*Sp. Moore*) *Verdoorn* stat. nov. *J. transvaalense* Sp. Moore in J. Bot., Lond. 56: 10 (1918).

Type: *Rogers* 18108, Modjadjes, Letaba, Transvaal.

TRANSVAAL.—Soutpansberg: Louis Trichardt, *Breyer* 22718; 22719; Malta Gorge, *Junod* 4437; Elim, *Obermeyer* 29253; Makonda, *Westphal* in Tvl. Mus. 29114; Pepeti Falls, *Smuts and Gillett* 3233; 3180. Pietersburg: Blauwberg, *Codd & Dyer* 9128; 9168; Woodbush, *Bolus* 11117 (BOL); *Rehmann* 5952 (BOL); *Eliovson* in Wits Herb. 26953; The Downs, *Junod* 4158. Belfast: Dullstroom, *Galpin* 13297. Ermelo: Mavieriestad, *Pott* 4909. Letaba: Selati Mission, *Gerstner* 5510. Pilgrims Rest: Sabie Hoek, *Burtt-Davy* 1519. Lothian, *Forest Officer* 22; Bushbuck Ridge, *Smuts and Gillett* 2351. Piet Retief: *Sidey* 2054; *Pole Evans* 16.

NATAL.—Eshowe: on margin forest, *Gerstner* 3886 (NH); Hlinza Forest edge, *Lawn* 1335 (NH); Emkazeni Forests, *Fernando* 10399 (NH). Camperdown: Fairfield, *Rudatis* 2042 (NH). Pietermaritzburg: Townhill, *F.G.C.* 339; Howick, Shafton, *Hutton* 1180 (GRA).

CAPE.—Bizana: *Acocks* 12230; Emagushen, *Tyson* 2815; 3150 (SAM).

This varietal form has not been collected outside South Africa, but in the tropical regions there are very closely related species.

J. streptopus var. *transvaalense* (see plate 12) is more widely spread than the typical variety. It is distinguished by the smaller, ovate-acuminate leaves, 1·5–3·5 cm. long and ·8–1·4 cm. broad, and the inflorescences frequently being 1-flowered. Although these characters give the specimens a distinct appearance, they are not fixed and therefore cannot be considered to be specific. A few of the leaves often become large and take on the shape of the typical form while the inflorescence occasionally is more than 1-flowered. In the shape of the leaf and the 1-flowered inflorescence it resembles *J. swynnertonii* Sp. Moore from Portuguese East Africa, the Rhodesias and Tanganyika, but this latter species has slightly larger leaves with more prominent veins. It is doubtful whether *J. swynnertonii* (described in 1911) can be anything more than another variety of *J. streptopus*.

3. OLEA.

Linn., Gen. Pl., ed. 5, 8 (1754); Benth. & Hook. in Gen. Pl. 2, 2: 679 (1876); Harvey ex Wright in Fl. Cap. 4, 1: 485 (1907); Phillips Gen. S.A. Fl. Pl. ed. 2: 572 (1951) pro parte.

Shrubs or trees, sometimes forest trees up to 100 feet tall. *Leaves* opposite, entire, lepidote scaly, sometimes minutely and sparsely so. *Inflorescence* trichotomous panicles, many flowered, axillary or terminal. *Calyx* persistent, cucullate, 4-toothed or shortly 4-lobed. *Corolla* united into a short tube, 4-lobed, lobes rather broad forming a sub-globose bud, ultimately reflexed with tips ascending, deciduous. *Stamens* 2, inserted on the corolla-tube, filaments short, anthers dorsifixed, relatively large with extrorse dehiscence. *Ovary* subglobose, narrowed into a short style, stigma terminal, bi-lobed; ovules 2, pendulous. *Fruit*, a drupe with a thin fleshy layer, endocarp rather hard with large seed cavity; seed usually solitary, endosperm present, cotyledons thin.

Type species: Olea europaea *Linn.*, the cultivated Olive.

The description by Phillips in Genera of S.A. Flowering Plants was drawn up from both *Olea* and *Linociera* species in South Africa and therefore only partly applies to *Olea*. The reasons for keeping *Linociera* separate are given in the notes on that genus.

The leaves of *Olea* species never have acarodomatia in the axils of the veins below; the inflorescences are usually many to very densely many-flowered and the flowers are small, remaining in the bud stage rather long, with the buds subglobose, and, in all Oleas examined, the ovules were attached at the apex and endosperm was present in the seed.

Key to Species.

Inflorescence axillary as well as terminal:
- Leaves usually densely covered with small scales below, linear-lanceolate to narrowly oblong-elliptic..... 1. *O. africana.*
- Leaves fairly sparsely and very minutely scaly below appearing minutely pitted, lanceolate-elliptic to elliptic, usually broadest about the middle and from there tapering to base and apex; ultimate branchlets slender usually whitish, in parts obviously quadrate..... 2. *O. woodiana.*

Inflorescence terminal and axillary only in the two upper pairs of leaves:
- Leaves linear-oblong, up to about 1 cm. broad, broadest in upper two-thirds, long cuneate to the base..... 3. *O. exasperata.*
- Leaves of various shapes and sizes but never linear-oblong, usually more than 1 cm. broad..... 4. *O. capensis* (aggregate sp.).
  - Fruit subglobose to oblong-elliptic, up to 1 cm. long; shrubs or trees up to 50 feet tall; leaves crowded on herbarium specimens; inflorescence densely flowered:
    - Leaves very variable often rounded at apex; midrib prominent beneath from base to apex; branchlet dark grey to greyish brown; Cape coastal regions..... 4a. subsp. *capensis.*
    - Leaves usually broadly elliptic, shortly acuminate to base and apex; midrib prominent only in lower half beneath, disappearing in upper half; branchlets grey to whitish, leaves deciduous with prominent leaf-scars. Transvaal and Natal..... 4b. subsp. *enervis.*
  - Fruit large, oblong-elliptic about 1·5 cm. long; forest trees sometimes 90 feet tall; leaves elliptic, tapering to base and apex; petiole usually long and spreading and leaves not very crowded on herbarium specimens; inflorescence many flowered but not densely so..... 4c. subsp. *macrocarpa.*

1. **O. africana** *Mill.* Gard. Dict. Ed. 8, n. 4 (1768); Adamson in Flora of the Cape Peninsula p. 669 (1950). *O. chrysophylla* Lam. Tabl. Encycl. 1: 29 (1791) et Dict. 4: 544 (1794); Baker in Fl. Trop. Afr. 4, 1: 18 (1902); Chevalier in Rev. de Bot. Appl. no. 303–304 (1948); Turrill in F.T.E.A. "Oleaceae" p. 9 (1952); *O. europaea* Thb. Prod. Pl. Cap. 2 (1794) non Linn.; *O. similis* Burch. Trav. 1: 177 (1822); *O. europaea* var. *nubica* Bkr. in Fl. Trop. Afr. 4, 1: 18 (1902); *O. verrucosa* Link. Enumer. Pl. Hort. Berol. 1: 33 (1821); DC. Prodr. 8: 285 (1844); var. *brachybotrys* DC. l.c.; Harv. ex Wright in Fl. Cap. 4: 486 (1907), excl. syn. *O. woodiana* Knobl.

[According to Chevalier l.c., *O. somaliensis* Bkr., *O. ferruginea* Royle, *O. cuspidata* Wall. ex G. Don., *O. schimperi* Gandoger and *O. monticola* Gandoger (all unknown in South Africa) are also synonyms of *O. chrysophylla* and therefore of *O. africana.*]

Trees often 10 to 40 feet tall, sometimes stunted bushy growths; branchlets verrucose. *Leaves* with a tendency for the sides to curl downwards as well as marginal rim being reflexed, dark green above, paler beneath where it is densely covered, rarely fairly sparsely so, with small silvery, golden or pale green scales, linear-lanceolate or narrowly oblong elliptic, narrowed at base and apex (apex sometimes bluntly rounded), 1·9–8·5 cm. long and 0·7–1·5 cm. broad, rarely broader (see Clanwilliam and Barberton specimens), mucronate; midrib impressed above, prominent beneath; lateral veins obscure or faintly obvious, loops forming a more or less continuous line within the margin, petiole usually 3–10 mm. long. *Panicles* axillary, sometimes a short terminal panicle too, varying in size, usually shorter than the subtending leaf the branches verrucose and scaly; bracts deciduous. *Flowers* small, white. *Calyx* cupular, up to 1 mm. long, very shortly or obscurely 4-toothed. *Corolla* with a short tube, about 1 mm. long; lobes more or less connivent, eventually spreading to reflexed, about 2 mm. long, 1·5 mm. broad, margins narrowly infolded. *Stamens* inserted on the corolla, filaments under 1 mm. long, more or less terete, anther attached near the base, 1·5 mm. long, 1 mm. broad. *Ovary* sub-globose, narrowing into a short style; stigma 2-lobed, forming a conico-globosa head; ovules pendulous. *Drupe* green with whitish spots turning black or prune-coloured, sub-globose to oblong in outline, up to 1 cm. by 9 mm. on dry specimens.

Fig. 3 and Plate 13.

Type: no specimen preserved, but plant described came originally from the "Cape of Good Hope". Types of synonyms: *O. chrysophylla* Lam., *Sonnerat*, Reunion (*fide* Turrill); *O. europaea* Thb., *Thunberg*, Drakenstein near Cape Town; *O. similis* Burch., *Burchell*, Olyvenhout Bosch, near Cape Town; *O. verrucosa* Link., plant described came originally from the "Cape of Good Hope"; *O. europaea* var. *nubica* Bkr., *Schweinfurth* 249, near Suakin, Nubia.

Transvaal.—Soutpansberg: Wyllies Poort, *Hutchinson* 2064 (BOL); *Gerstner* 5865. Pietersburg: Blaauwberg, *Smuts* and *Pole Evans* 899; *Codd* and *Dyer* 9135; *Houseman* in Col. Herb. PRE. 5328; Leipsig, *Tsheuschaner* in Tvl. Mus. Herb. 29509 (stunted); Letaba: Woodbush, Hoffman 18; The Downs, *Rogers* 20165. Potgietersrust: Makapansberg, *Rehman* 5395 (SAM). Waterberg: Naboomspruit, *Galpin* M. 208 (SAM). Marico: near Zeerust, *Marloth* 9535; *Thode* A1443; Wonderfontein, *Burtt Davy* 7222; banks of Klein Marico, *Burtt Davy* 7243. Lichtenburg: near Lichtenburg, *Kinges* 1513 and 1738. Ventersdorp: Goedgedacht, *Sutton* 620. Rustenburg: Swartruggens *Sutton* 851; 850; near Rustenburg, *Hutchinson* 2932; Boshoek, *Rose-Innes* 57; Buffelspoort, *Turner* 5. Pretoria: Lotsy and Goddyn s.n. (L.); Aapies Poort, *Rehmann* 4052 (SAM); Magaliesberg, *Zeyher* 1133 (SAM); Fountains Valley, *Repton* 309a and 125; *Hutchinson* 2317; *Verdoorn* 421 and 605; Curtis Hill, *Pole Evans* 257. Brits: *Gun* 2; 3 (stunted). Krugersdorp; Hekpoort, *Cohen* 495; 1083; and 1240. Witbank: near Loskop Dam, *Mogg* 17285. Lydenburg: Sekukuniland, *Barnard* 68; 269; *Barnard* and *Mogg* 905. Letaba: Modjadjies Reserve, *Krige* 134; Kruger National Park, *van der Schyff* 56, 183; banks of Letaba, *Burtt Davy* 2548. Nelspruit: Malelane, *Codd* 5223. Barberton: Rogers *Thorncroft* in Roger's Herb. 30059; *Pott* 5695 (leaves broad, marginal veins obvious)

Swaziland.—Ubombo Mountains, *Miller* S/54; *Hornby* 2812.

Natal.—Eshowe: Empangeni Rd., *Lawn* 1667 (NH). Weenen: *West* 1211; Umhlumba, *West* 1453. Hlabisa: False Bay, *Gerstner* 5242; White Umfolosi, *Gerstner* 3528 (NH). Misinga: *Killick & Marais* 2116. Umvati: *Killick & Marais* 2118 (stunted). Durban: *Medley Wood* 7750; Berea Bush, *Medley Wood* 3156 (NH) (this specimen is *O. africana* and not *O. woodiana*, mixed gathering under nos. 548 & 3156 explains citation under *O. woodiana*).

BASUTOLAND.—Mafeteng: Likhuele Mtn., *Dieterlen* 1242. Leribe: *Dieterlen* 313, and 715 (stunted). Mamathes: *Guillarmod* 77 (NH).

ORANGE FREE STATE.—Senekal: *Goossens* 977. Ladybrand: *Patterson* 5090 (GRA). Bloemfontein: *Pot* 626 (BOL); Naval Hill, *Compton* 15662 (NBG). Fauresmith: Vaalberg, *Smith* 5469; reserve hill, *Smith* 5588; *Henrici* 1883; *Verdoorn* 2375; south townlands, *Verdoorn* 940; Bergplaas, *Verdoorn* 1660, 1655; and 2759 (stunted).

BECHUANALAND.—Kanye: *Miller* B/248; Pharing, *Hillary* and *Robertson* 523; Ootsi, *Miller* B/231.

SOUTH WEST AFRICA.—Aus: *Pillans* 5964, Griqualand West variant (BOL); *Marloth* 4654. Grootfontein: *Liebenberg* 4880; Bristoes farm, *Maguire* 1740 (NBG); farm Kumkauas, Kinges 2890; Venterspost, *Schoenfelder* S464. Otavi: *Dinter* 5294. Rehoboth: Bullspoort, *Rodin* 2965.

CAPE.—Komgha: *Flanagan* 17. Queenstown: Bowker's Park, *Galpin* 2566; Long Hill Peak, *Galpin* 7730. King Williams Town: *Sim* 2155. Keiskama Hoek: Ngumeya Forest, *Stayner* 70 (GRA). Somerset East: *MacOwan* s.n. (GRA); Boschberg, *MacOwan* 1364 (SAM). Graaff-Reinett: *Bolus* 610 (BOL). Bathurst: *Smuts* 1329; *Britten* 2385 (GRA). Alexandria: *Sim* in F.D. Herb. 3166. Uitenhage: *Drege* s.n.; *Ecklon & Zeyher* s.n.; *Prior* s.n.; *Krauss* 1795 (BOL); Paterson 2329 (BOL); Springfields, *Paterson* 1913 and 2194 (GRA). Humansdorp: Bitouw River, *Fourcade* 619 (GRA); Hankey Reserve, *Sim* 3958; and 3995 (Forestry). Knysna: Belvedere, *Duthie* 33 (GRA). Oudtshoorn: Gango, *Britten* 1743 and 1649 (stunted) (GRA). Riversdale: Corenti River, *Muir* 342; 5147 (GRA); near Riversdale, *Schlechter* 2005 (GRA). Gordonia: Upington, *Kotze* 839, Griqualand West variant. Taungs: *Rodin* 3629 (BOL); Buxton, *Bruechner* 1214. Kimberley: near Taungs, *Rodin* 3629; Nooitgedacht, *Mogg* 15111. Barkly West: Droogegrond, *Whitlock* s.n.; between Delpoort Hope and Kneukel, *Acocks* in Hafstroom Herb. H1215; Boetsap, *Brueckner* 132. Hay: near Campbell, Pole Evans 6; 8; and 30; Griquatown, *Marloth* s.n. (stunted); Blaauw Poort, *Wilman* 1316; Papkuil, *Marloth* 9946. Victoria West: Brakfontein, *Thode* A2167. Namaqualand: Rattel Poort, *Pearson* 2966 (BOL). Calvinia: Lokenburg, *Story* 4284. Clanwilliam: Greys Pass, *Barker* 6190; *Maguire* 2029; *Pillans* 9839, large leafed specimens, leaves about 1·9 cm. broad (BOL); Uitkyk Pass, *Bond* 1412 (NBG); Pakhuis Pass, *Compton* 4741 (NBG); *Esterhuizen* 14983, short broad leaves, (BOL). Piquetberg: *Pillans* 8629; 7178 (BOL); Pickeniers Pass, *Pillans* 5153 (BOL); Modderfontein, *Howes* 224. Ceres: Mitchells Pass, *Esterhuysen* 20719; 14736 (BOL). Ladysmith: Sewe Weeks Poort, *Bond* 258 (NBG). Worcester: Hexriver Mountains, *Rehmann* 2704. Paarl: Paarl Mountain, *Drege* s.n.; Klein Drakenstein, *Galpin* 11041. Stellenbosch: Jonkershoek, *Parker* 4730 (SAM); Helderberg: *Parker* 4093 (NBG). Peninsula: Table Mountain, *Drege* s.n.; *Gerstner* 6142; *Lotsy* and *Goddyn* (L.); Devil's Mountain, *Drege* s.n.; Kirstenbosch, *Esterhuizen* 72 and 662 (NBG); Llandudno, *Compton* 21029 (NBG); west coast, *Humbert* 9505; Blinkwater Waterfall, *Marloth* s.n.; Karbonkelberg, *Adamson* 1209.

Also occurs in North and East Tropical Africa and the Mascarenes and, according to Chevalier, in India and Arabia as well.

It is to be expected that a species with such a wide distribution will vary to some extent and that regional forms will occur. An example of such a form may be seen in specimens from the Griqualand West region. Here the leaves are on the whole smaller with very silvery scales on the lower surface and with the margins incurled, but this form grades into the more usual and it is not strictly confined to the region mentioned. A large leafed form has been collected in the Clanwilliam area and at Barberton. Another variation which, however, is not a regional one, is the dwarfed or stunted form. Such specimens may be found in any region and they are usually growing in the neighbourhood of normal trees.

That this stunted form is very different from the normal growth is remarked on by Chevalier,* but it certainly cannot be regarded as a variety for it has been observed that from such a stunted bush a normal branch may develop.

This is borne out by the finding of Mohammed Drar, published in Bulletin 149, Technical and Scientific Services, Egypt, pages 85–88 (1936), where he shows that *O. europaea* var. *nubica* Bkr. is a " sucker specimen " (that is the stunted form, from his description and photograph) of " *O. chrysophyllum* ". Among the specimens cited these stunted ones and the regional forms mentioned are indicated.

The habitat of *O. africana* ranges from forest and riverside bush to open grassveld, flats, stony ground, mountain kloofs or rocky ridges. It may be found in flower from October to March.

The species is distinguished by the densely scaly under surface of the leaf, which is linear-lanceolate or narrowly oblong-lanceolate, rarely some leaves obovate-oblong, margins usually recurving as the leaf dries, lateral veins anastomosing near the margin, the loops forming a more or less continuous line along, but a short distance from, the margin; by the axillary inflorescence and the fruit which is oblong-globose and up to 1 cm. long. It is closely related to the cultivated olive, *Olea europaea* Linn., and may be the origin of it.

Chevalier in the above-mentioned paper keeps the wild species separate specifically from the cultivated and this seems a wise and orderly treatment. The only tangible differences between the two species are the larger flowers and the larger and more fleshy fruits of *O. europaea* which may have come about through selection and cultivation but, if so, these characters have now been established and reproduce true to type.

For the wild species, Chevalier gives *O. chrysophylla* Lam. (1791), as the oldest name with *O. verrucosa* Link., etc., as synonyms, but in doing so he seems to have overlooked the fact that *O. africana* Mill. was described in 1768 and therefore has priority. It is possible that Chevalier ignored Miller's name as that of an insufficiently known species. At first it did seem doubtful to some of us whether, in the absence of a type specimen, Miller's species could be identified with certainty. The question was asked, is there sufficient evidence to establish that *O. africana* Mill. is the same as the species which had come to be known as " *O. verrucosa* Link." at the Cape and is described under that name in Flora Capensis. After months of investigation which included writing to Prof. Adamson of the University of Cape Town and the Director of the Royal Botanic Gardens, Kew, it was finally settled that this is so. The consensus of opinion is that Miller's notes leave one in no doubt, for he writes (1) that the species " grows naturally at the Cape " and (2) that it grows to the height of and bears some resemblance to *O. gallica* Mill., that is *O. europaea* L., the cultivated olive. This cannot be said of any of the other species at the Cape, and also Miller's description of the leaf does not fit that of any of the others. Furthermore Miller cites, as a synonym of his O. africanum, Boerhaaves phrase-name for a species from the " Cape " and it too describes unmistakably the species under discussion.

Specimens of *O. chrysophylla* Lam. from Mauritius and Reunion, the type locality of the species, seen among sheets sent on loan from the Ryksherbarium, Leiden, are obviously conspecific with certain specimens from South Africa and also some from tropical east Africa and Abyssinia. It does not seem feasible to separate the specimens from these three remote countries even into distinct varieties for in some cases they compare better with each other than for instance, the Griqualand West form with the majority of specimens from the rest of South Africa. No attempt is therefore being made to follow Chevalier's division of the species into 8 varieties, evidently based principally on the country of origin, or to give any sub-specific rank to the ecotype in S. Africa.

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* " L'Origine de l'Olivier cultive et ses variations " in Rev. Bot. Appl. n. 303–304 (1948).

The timber of *O. africana* is considered to be valuable and durable. The leaves are eaten by stock and the natives use an extract from the leaves boiled in water as coffee.

The common name " Wild Olive " is generally used for this species in South Africa. There is no modern record of the name " Slagenhout " mentioned by Boerhaave.

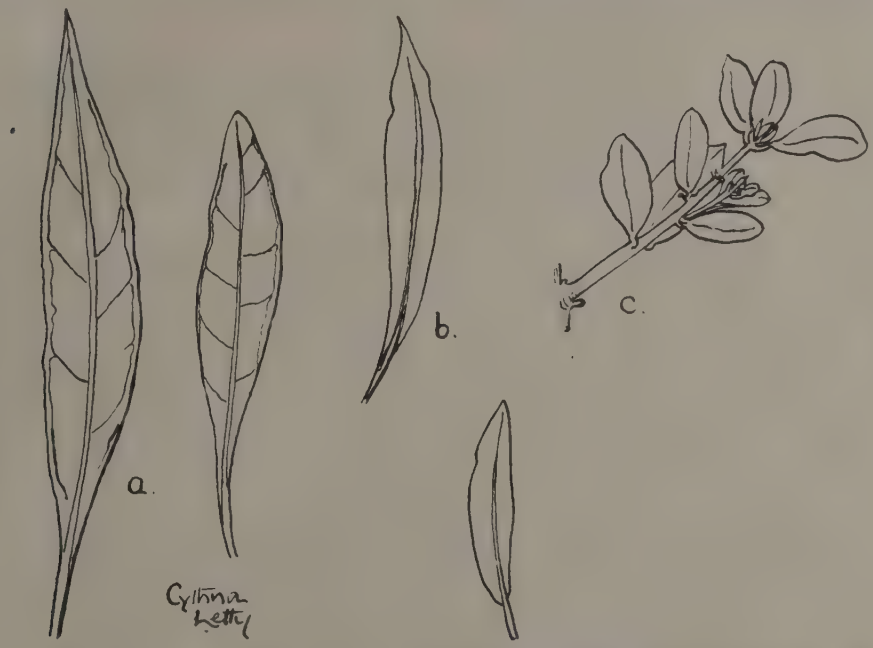

FIG. 3.—Olea africana Mill.; *a*, example of leaves from a specimen from the Peninsula; *b*, from Griqualand West; *c*, stunted form, from Fauresmith district.

2. **O. woodiana** *Knobl.* in Bot. Jb. 17: 532 (1893); Medley Wood in Natal Plants, 3, plate 237 (1902); Sim, Forest Fl. C.C. p. 266, pl. 108, (1907). *O. mackenii* Harv. ex Wright in Fl. Cap. 4, 1: 488 (1907). *O. listeriana* Sim ex Lister in Rep. Conserv. For. Cape for 1897, 98 (name only); Wright in Fl. Cap. 4, 1: 1129 (1909); Sim Forest Fl. C.C. p. 266 in obs.

Tree 12–50 feet, rarely 100 feet tall, with whitish bark, smooth or fluted; ultimate twigs pale grey or whitish, more or less lenticular, at least some of the upper internodes 4-angled. *Leaves* lanceolate-elliptic to elliptic, usually broadest about the middle and from there narrowing to an acute base and apex (apex sometimes rounded), 4–8 cm. long, ·8–3·3 cm. broad, flat with just the marginal rim reflexed and often loosely undulate, minutely scaly, giving the appearance of being minutely pitted, especially on lower surface, midrib more or less impresed above, prominent below, lateral veins sometimes faintly obvious, then prominent above, anastomosing in large loops near the margins (loops *not* forming an almost straight line along the margin); petiole 4–10 mm. long. *Panicles* axillary and quite frequently terminal too, many flowered but not dense and compact; branches slender, sub-terete, 4-angled or variously flattened and fluted, internodes and peduncles relatively long, pedicels short; bracts up to 4 mm. long, sub-deciduous. *Calyx* small cupular and shortly 4-lobed, up to

1 mm. long. *Corolla* white; tube ·75 mm. long; lobes about 2·25 mm. long and 1·5 mm. broad, forming a sub-globose bud, eventually reflexed. *Stamens* with filaments inserted on the tube, free for about 1 mm., anther 1·5 mm. long, 1·25 mm. broad, attached about at the middle. *Ovary* sub-globose; style very short; stigma 2-lobed conico-globose; ovules pendulous. *Drupe* drying blackish, semi-ovoid, narrowing to apex and oblique at base, usually about 1 cm. long and 5 mm. broad in dried specimens, occasionally slightly larger.

FIG. 4 AND PLATE 14.

Type: *Medley Wood* 548, near Durban. Types of synonyms: *O. mackenii* Harv., *Gerrard* 380, Tugela, Natal; *O. listeriana* Sim ex Lister, *Sim* 2143, East London.

TRANSVAAL.—Pilgrims Rest: van der Merwe Bush, *Burtt Davy* 1428.

SWAZILAND.—Stegi: Ubombo mountains, *Miller* S55 and S20 (leafy specimens only).

NATAL.—Mtunzini: near Inyoni mouth, *Gerstner* 1957; at Inyoni mouth, *Gerstner* 2444. Durban: near Durban, *Medley Wood* 548, isotype (SAM); *Medley Wood* 7975; shore near Durban, *Medley Wood* 7879, cited Bot. Jb. 51: 76 (NH); Bluff, *Medley Wood* 12634 (NH). Pinetown: Isipingo Beach, *Ward* 649.

CAPE.—Port St. Johns: *Galpin* 11464; *Doran* in F.D. Herb. 2265, 2136, 2137 (galls on last two specimens); *Robertson* in F.D. Herb. 1862; *Miller* 6130 (galled specimen). Komgha: *Flanagan* 618. East London: *Sim* 2143, small leaves, distributed as O. listeriana; *Hunter* in F.D. Herb. 1725. Bathurst: Port Alfred, *Rogers* 905; Hopewell, *Acocks* 11047. Port Elizabeth: Alexandria, *Strauch* in F.D. Herb. 3163 & 3246; *Sim* in F.D. Herb. 3164.

This species has so far not been recorded outside South Africa.

In connection with the type of this species, it must be made clear that a mixture was distributed under Medley Wood's Garden Distribution No. 548, which is the same as his own No. 3156. The specimens with either or both these numbers at Berlin and in the South African Museum, Cape Town, are *O. woodiana* whereas specimens with the same numbers in the Kew Herbarium and the National Herbarium, Pretoria are *O. africana* (= O. verrucosa). This error probably accounts for the fact that *O. woodiana* Knobl. is cited as a synonym under *O. verrucosa* Link. in the Flora Capensis while *O. mackenii* Harv., which is synonymous with *O. woodiana* Knobl., is there described as a new species.

From *O. africana*, the only other species with axillary inflorescences, *O. woodiana* is distinguished principally by the shape of the leaves which are more or less elliptic, broadest about the middle and from there narrowing to the base and apex (that is the margins are not more or less parallel for a certain distance as in the linear- or narrowly oblong-lanceolate leaves of *O. africana*); the under surface being minutely and fairly sparsely scaly, appearing pitted, instead of obviously and densely scaly; the flatter leaves (not inclined to curl up longitudinally with the under surface often concave); the anastomosing loops of the veins not forming a more or less straight line inside the margin; having rather large terminal panicles as well as axillary; and the fruit being somewhat longer, usually oblique and narrowing towards the apex (semi-ovate in outline).

Among the species with only terminal inflorescences, *O. woodiana* resembles *O. capensis* subsp. *macrocarpa* to a certain extent, especially in the leaves. It differs in the ultimate twigs being whitish and at least in part 4-sided; the branches of the inflorescences being very slender and having longer internodes; peduncles with the flowers more or less clustered at the ends on relatively short pedicels; and fruits not as large, up to 1 cm. long.

O. woodiana has a comparatively restricted distribution being found only in the eastern regions of S. Africa. At Durban, according to records, it grows in the vicinity of *O. africana*.

The timber is described as " steel-like " by Gerstner.

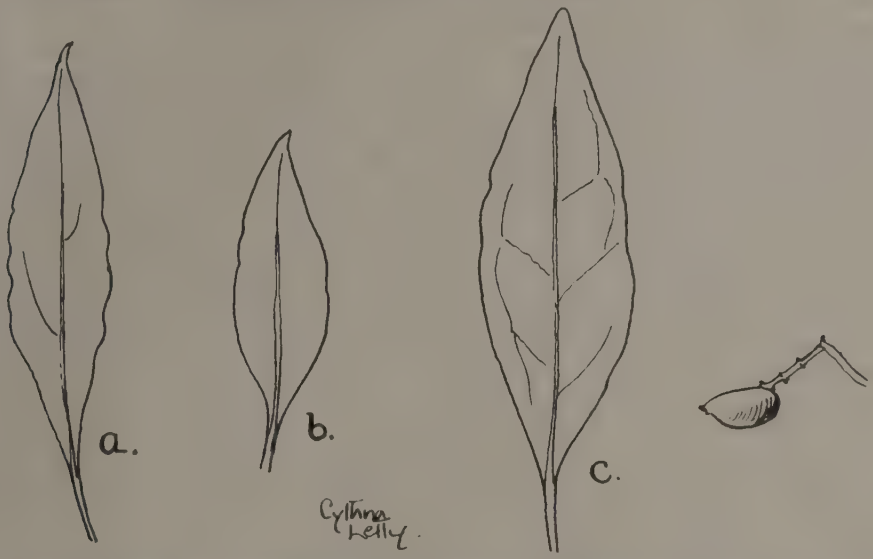

FIG. 4.—Olea woodiana Knobl.; *a*, example of leaf-shape from type locality; *b*, from East London; *c*, from Port St. John's, with fruit.

3. **O. exasperata** *Jacq.* Hort. Schoenbr. 3, 1, t 251 (1798); DC. Prodr. 8: 287 (1844); Knobl. in Bot. Jb. 17: 533 (1893); Harv. ex Wright in Fl. Cap. 4, 1: 486 (1907); *O. humilis* Eckl. South Africa quart. journ. 1: 370 (1830); DC. Prod. 8: 287 (1844); Sim in Forest Fl. of C.C. p. 266, pl. 120 (1907).

Bushy or straggling shrubs or small umbrella shaped trees, from about 2 feet to 20 feet tall, rarely taller, branchlets rough with numerous raised lenticles. *Leaves* with a tendency for sides to curl downwards as in *O. african*, linear-oblong, 4–8·5 cm. long, 6–10 mm. broad, rarely 1·5 cm. broad; broadest in the upper two thirds, narrowing gradually to the base, minutely pitted on both surfaces, especially on lower, midrib raised on lower surface, sometimes also on upper, a few lateral veins sometimes obvious and raised above but disappearing about half way to the margin, anastomosing seldom seen, but if so loops curved; margin rim reflexed; petiole 4 mm. long rarely 5 mm. *Panicles* terminal, short, broad, many flowered; buds sub-globose; bracts very small, pointed, sub-persistent. *Calyx* short, cupular, glandular, shortly 4-toothed. *Corolla* with a short tube under 1 mm. long; lobes up to 2·75 mm. long, margins narrowly infolded. *Stamens* with filament almost 1 mm. long; anthers large brownish about 2 mm. long and 2 mm. broad, dorsifixed. *Ovary* narrowing into a short style; stigma 2-lobed forming a conico-globose head; ovules pendulous. *Fruit* " black purple " when ripe, up to 1 cm. long and 8 or 9 mm. broad, sub-globose to oblong-globose.

FIG. 5 AND PLATE 15.

Type: figure in Jacq. Hort. Schoenbr. 3, 1, t 251, plant originally from " Cape of Good Hope ". Type of synonym: *O. humilis* Eckl., *Ecklon*, " in dunes at the Cape ".

CAPE.—East London: *Sim* 2310. Bathurst: Kariega Mouth, *Story* 3254; Kowie, *Burchell* 3829; *Tyson* s.n.; *Britten* 5009 (GRA); *Salisbury* s.n. (GRA); Kasouga, *Britten* 2110 and 2339; Port Alfred, *Rogers* s.n. (GRA). Uitenhage: Addo, *E.* & *Z.* s.n.; *Drege* s.n.; Koega and Swartkop Rivers, *Zeyher* 3373 (SAM). Port Elizabeth: *Strauch* 4233; *Paterson* 852 (BOL); St. Georges Strand, *Long* 856; Baakens River, *Drege* 343 (GRA); near Schoenmakers Kop, F.D. Herb. 19 (GRA); Swartkop Riv. Mouth, *Drege* s.n. (L); *Patterson* 1974; Humewood, *Lanham* 130. Humansdorp: *Phillips* 3349; Tsitsikama, *Fourcade* 232a (GRA); between Sland and Kromme Rivier, *Sim* 3 (GRA). Knysna: Buffalo Bay, *Keet* 427; Woodbourne, *Keet* 751 in F.D. Herb. George: *Compton* 14347 (NBG). Riversdale: S.S.E. of Riversdale, *Acocks* 14592; Albertinia, *Muir* 838. Bredasdorp: Brandfontein, *Smith* 4974; *Taylor* 324 (NBG); Cape Agulhas, *Ecklon* s.n. (only specimen on right hand of sheet), (SAM). Malmesbury: Bok Point, *Compton* 9405 (NBG); Bokbaai, *Esterhuysen* 3840 (BOL). Caledon: *Pole Evans* 4329; Middelvlei Reserve, *Hubbard* 236 (BOL); between Eerste Rivier and Swart Klip, *Pillans* 9211 (BOL); Buffels River Mouth, *Pillans* 8301. Stellenbosch: Strand, *Parker* 3591 and 3662 (BOL). Peninsula: Constantia, *Marloth* 8407; Camps Bay, *Adamson* 571; Cape Town, *Marloth* 7542; Hout Bay, *Acocks* 638; *Bond* 117 (NBG); *Bolus* 13749 (BOL); near Muizenberg, *Schlechter* 1264 (GRA); Uitvlugt, *Muller* in F.D. Herb. 5120 (GRA); Little Lions Head, *Compton* 18583 (NBG); Karbonkelberg, *Esterhuysen* 21172 (BOL); Witsand, *Lotsy* and Goddyn 1587 (L).

Endemic to the western and southern coasts of the Cape Province.

The most common habitat of this species is on the sand dunes in coastal bush or scrub forest. It also occurs on limestone hills, such as in Bredasdorp, or in open grass veld or valleys along the coastal belt. It is an easily recognised species with its narrow leaves which are linear oblong, broadest in the upper two thirds and gradually narrowing in the lower half to a short petiole.

The leaves resemble those of *O. africana* in the tendency of the margins to roll backwards but the lower surface in *O. exasperata* appears minutely and densely pitted, not scaly as in *O. africana*. The terminal inflorescence of *O. exasperata* is another distinguishing character between these two species.

In Sim's Forest Flora of the Cape Colony, this species is under the name *Olea humilis* Eckl., a latter homonym.

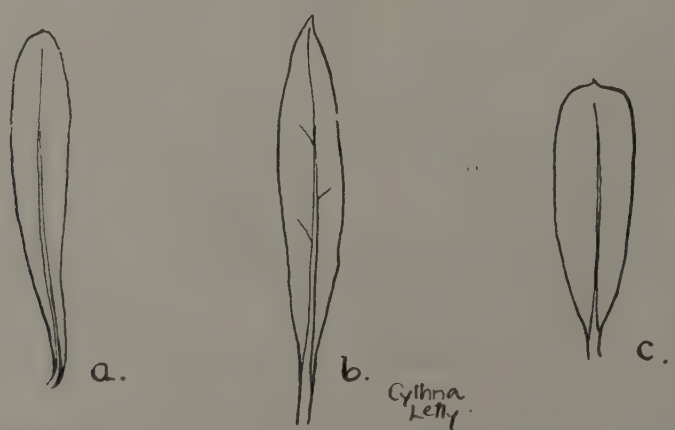

FIG. 5.—Olea exasperata Jacq.: *a*, example of leaf-shape from Constantia; *b*, from Caledon; *c*, from Camps Bay.

4. **O. capensis** *Linn.*, aggregate species:

(*a*) subsp. **capensis.**
(*b*) subsp. **enervis** (*Harv.*) *Verdoorn*, stat. nov.
(*c*) subsp. **macrocarpa** (*C.H. Wr.*) *Verdoorn*, stat. nov.

Trees or shrubs, from shrubby growth about 2 feet high or taller, to trees from 5–35 feet tall, or forest trees up to 90 ft. tall. *Leaves*, light to dark green, undersurface somewhat paler than the upper or sometimes concolorous, occasionally suffused purplish, very variable in texture, size and shape, but not linear or oblong-linear, usually much over 1 cm. broad; petiole green or purplish; margins sometimes faintly to very decidedly undulate, the rim only recurved; scales minute appearing like minute pits especially on under surface; midrib prominent below, at least at base, lateral veins, when visible, forking just beyond halfway to the margin the anastomosing branches looped. *Panicles* terminal and in axils of the 2 upper pairs of leaves, many-flowered, branches glabrous, scaly, variously angled and sulcate; bracts small spreading ovate to subulate about 1 mm. long. *Calyx* cupular 4-toothed or 4-lobed almost to the middle, minutely ciliate. *Corolla* up to 3 mm. long, lobed almost to the base, lobes 4, rarely 3 to 5, ovate-oblong to oblong, rounded at the apex but with a minute incurved mucro and the rather thick margins slightly incurved. *Fruit* sub-globose, ovoid, oblong-globose to oblong-elliptic, rarely at some stages pointed (see Bolus 23227 from Caledon and Pillans 7887 Piquetberg) from 5 mm. long and 4 mm. diam. up to 2 cm. long and 1 cm. diam.

The distribution of this aggregate species, is restricted to southern Africa, that is if the four closely related species in tropical Africa are kept distinct by future workers on the genus. The tropical species are: *O. welwitschii* (Knobl.) Gilg and Schellenb. *O. hochstetteri* Bkr.; *O. urophylla* (Gilg) Gilg and Schellenb.; and *O. guineensis* Hutch. and C.A. Sm. (= *O. hochstetteri* fide Turrill F.T.E.A.), all described later than *O. capensis* L. In appearance, judging from the few tropical specimens seen, these differ in general from the S.A. species in the inflorescences being coarser with their branches thicker and the flowers fewer, which when in bud are broader than long. The differences might also come to be considered as merely subspecific.

After years of study and the examination of material from all the principal herbaria in South Africa and some overseas, including the Royal Botanic Gardens at Kew, the following conclusions were reached: (1) that *O. capensis* L., *O. laurifolia* Lam., *O. enervis* Harv. and *O. macrocarpa* C.H. Wr. of the Flora Capensis comprise one variable and complex species; (2) that the material can be divided into 3 fairly distinct groups, but these groups cannot be given higher rank than that of subspecies because they grade into one another and because in some cases where the habitat of the specimens is not known or there are no mature fruits present it will not be possible to determine to which group the specimen belongs; and (3) that although there is considerable variation within these groups especially in one of them, no further subdivisions can be made at this stage because in no further instances was it found that certain combinations of features were repeated giving a similar appearance to a fair number of specimens and so isolating them as a group; in most cases only single variants were found. The reasons for these conclusions should become more evident from the notes under the sub-species.

(*a*) subsp. **capensis.** *O. capensis* Linn. Sp. Pl. Ed. 1: 8 (1753); Dill. Hort. Elthm. t. 160, pl. 194 (1732); Bot. Reg. t. 613 (1822); Harv. ex Wright in Fl. Cap. 4, 1: 487 (1907); Adamson in Fl. of the Cape Peninsula p. 669 (1950); *O. buxifolia* Mill. Gard. Dict. ed. 8 (1768); *O. laurifolia* Lam. III. I: 29 (1791); J. Burm. Rar. Afr. Pl. 233 t. 81 fig. 1 (1739); Harv. ex Wright in Fl. Cap. 4, 1: 487 (1907) pro majore parte, excluding Burchell 5225 (= subsp. macrocarpa) and Wood 500 (= subsp. enervis); Adamson in Fl. of the Cape Peninsula p. 669 (1950); *O. undulata* Jacq. in Hort. Schoenbr. 1, 1, t2 (1797); var. *planifolia* E. Mey. in Comm. Pl. Afr. Austr. 176 (1837); *O. concolor* E. Mey. in Comm. Pl. Afr. 176 (1837) and in DC. Prod. 8: 286 (1844); *O. laurifolia* Lam. var. *concolor* Harv. ex Wright in Fl. Cap. 4, 1: 487 (1907).

This subspecies is distinguished by the following features: Shrubs or trees, up to 35 ft. tall, not taller forest trees. *Leaves* crowded on herbarium specimens, very variable, obovate-oblong, oblong, broadly oblong, sub-orbicular, elliptic, ovate- to lanceolate-oblong, or obovate- to oblanceolate-oblong; apex broadly rounded, obtuse, sub-acute or acute, sometimes acuminate, usually mucronate; petiole 3 mm. to 1·7 cm. long; midrib prominent on lower surface. *Panicles* compact and densely many flowered. *Fruits* variable in size and shape but not over 1 cm. long and 6 mm. diam.

Figs. 6, 7 and 8; Plates 16, 17 and 18.

Type: Linnaen Herbarium No. 204, plant from Cliffort's garden, originally from " Cape of Good Hope " (see plate 16). Types of synonyms: *O. laurifolia* Lam., specimen in Paris Herbarium (see plate 17); *O. undulata* Jacq., tab. 2, in Jacq. Hort. Schoenbr. 1, 1; *O. undulata* var. *planifolia* E. Mey., *Drege*, Zuurbergen; *O. concolor* E. Mey., *Drege*, between Nieuwekloof and Elandskloof, Tulbagh district. (See plate 18).

Natal.—Port Shepstone: Uvongo, coastal bush, *Letty* s.n.

Cape.—Lusikisiki: coast near Umkwani River, *Tyson* 2657 (SAM); Fraser Falls, *Acocks* 13431. Kentani: coast, *Pegler* 994; *Pegler* 826a (BOL). Komgha: *Flanagan* 655; Kei Mouth, *Schlechter* 6194 (GRA). East London; *Breyer* 23242; *Rattray* 509; coast, *Sim* 2102 and 2577 (NH); Bonza Bay, *Story* 4484; 11 m. W. of East London, *Hilner* 158 and 268 (GRA); Fort Pato Forest, in F.D. Herb. 1724. King William's Town: Pirie, *Sim* 1336 (BOL). Somerset East: Zuurberg Pass, *Story* 2300. Albany: near Hamilton Dam, *Dyer* 234; Hope Fontain, *Acocks* 12119; nr. Grahamstown, *MacOwen* 1210 (BOL); *Liebenberg* G. 300; Amos Kloof, *Galpin* 361; Howison's Poort, *Zeyher* 3377 (BOL). Bathurst: Southwell, *Story* 3135; 4494; 4495; Salt Vlei near Port Alfred, *Story* 4491; Kowie, *Britten* 2850 (GRA). Port Elizabeth: Van Stadens River, *Bolus* 1210 (BOL); Longmore Forest Reserve, *Long* 1009; Witteklip, *Rodin* 1047. Port Elizabeth: *Kemsley* 257 (GRA); Krakakamma, *Zeyher* 3378 (SAM); Swartkops River Valley in *F.D. Herb.* 4445; Hankey Reserve in *F.D. Herb.* 3952. Uitenhage: Van Stadens Gorge, *Long* 398; Hoffmankloof to Driefontein, *Drege* in Ryksherbarium 908161–541 (L); Dornnek and Bontjiesrivier, Zuurberg, *Drege* (K, L); Addo, *Zeyher* 547 (BOL). Humansdorp: Klipdrift, *Thode* A 2492; Clarkson, *Thode* A959; sanddunes at Slang River, *Phillips* 3390; Lottering Bush, Zitzikama, *Galpin* 4322; Storms Rivier Forest, in F.D. Herb. 3928; 4022; 4027; *Fourcade* 704 (GRA); Groot River Pass, *Fourcade* 675 (GRA); Ratels Bosch, *Fourcade* 392 (GRA, BOL). Uniondale: Prince Alfreds Pass, *Fourcade* 5870 (BOL). Knysna: in forest *Theron* 981; The Heads, *Laughton* in F.D. Herb. 8949; *Schonland* 3575 (GRA); Kaffir Kop Forest, *Keet* in F.D. Herb. 3566; nr. banks of lagoon, *Williamson* 30 (GRA); Noetzie *Taylor* 1224; 1225; Keurboomstrand, *Taylor* 596; Plettenberg Bay, *Smart* and *Rogers* 26812; Belvedere Brenton, *Duthie* 8 and 620 (GRA); Forests, *Duthie* 676 (GRA); Portland, *Duthie* 924 (GRA); near Knysna, *Burchell* (K, GRA); Kaatjies Kraal, *Burchell* 5227 (L); Deepwalls, *Rodin* 1167 (BOL); *Taylor* 700; *Phillips* in F.D. Herb. 5487 (3 sheets); *Keet* in F.D. Herb. 2661 and 3598; Farleigh Forests, *Keet* in F.D. Herb. 2337. George: Kaaimans

River, *Wilman* s.n.; Jonkersberg, *Burton* in F.D. Herb. 3775 (suggests a touch of " subsp. macrocarpa "); Mt. Pleasant, *Martin* 120 (NBG); Groenkop, *Robertson* in F.D. Herb. 7593. Swellendam: Grootvadersbosch, *Marloth* 3524. Bredasdorp: Cape Agulhas, *Galpin* 11254; Road to Stanford, *Maguire* 80 (NBG). Caledon: between Houwhoek Mountains and Palmiet River, *Burchell* 8161, small leafed variant, (K); Grabouw, *Britten* 3111 (GRA); Kogel Bay, *Parker* 4150; Mossel River, *Pots* in S.A. Museum 5051, accuminate; *Potts* 1652, rounded apex, (SAM); near Hermanus, Mossel River, *Guthrie* s.n.; Hermanus, *Burtt Davy* 18539 (BOL); Hangklip, *Rodin* 3107; *Bolus* 23227, pointed fruits, (BOL). Somerset West: Hottentots Holland, *Zeyher* 3374 (BOL). Stellenbosch: Sir Lowrys Pass, *Burchell* 8236 (K, L, GRA); *Schlechter* 7267 (GRA). Wynberg: between Wynberg and Constantia, *Burchell* 781 (K). Peninsula: without precise locality *Wallich* s.n. (K); *Sieber* 219; 220 (L); Kirstenbosch, *Zeyher* 182, named O. undulata Jacq., (BOL); *Pearson* 16627 and 25303 (BOL); *Kies* 11; *Compton* 10849; 10040 (from various trees pointed leaves and rounded; 10041; 10019 (NBG); *Esterhuysen* 11744 (elliptic-oblong fruits 1 cm. long, leaves broad and rounded at apex); 11834 (fruits up to 1 cm. long, leaves broad); 12853 (small leafed variant); 17516 (some leaves obtuse some acuminate); 264 (NBG); 650 (NBG); 11683, fruits up to 1 cm. long, broad leaves, (NBG); *Henderson* 1408 (NBG); *Compton* 8077 (NBG); *Bond* 82 (NBG); *Pillans* in BOL Herb. 1772, large purple leaves, twigs purple, (BOL); Groote Schuur, *Smuts* 1100 (pointed leaves); 1165 (broad apex); Bishops Court, *Galpin* 4814; Claremont, *Hutchinson* 3; Table Mountain, *Drege* s.n.; *Ecklon* and *Zeyher* 84·7 (some leaves rounded, some acuminate), labelled *O. undulata* Jacq. var. planifolia; *Pappe* s.n. (SAM); *Marloth* 5662, 7406, 11926; *Smuts* 1088; *Esterhuysen* 11401 (BOL); *Andreae* 263; *Pole Evans* 4327; 4328; Camps Bay, *Ecklon and Zeyher* 69·1; *Prior* s.n.; *Marloth* 7501; *Zeyher* s.n. (K, BOL); Muizenberg, *Bolus* 3904 (BOL); *Pillans* 3706; Adamson 944; Galpin 10344; Hout Bay, *Smuts* 1076; *Pillans* 3689; *Lotsy and Goddyn* 1929; 1840 and 1867 (L); Orange Kloof, *Wolley Dod* 866; *Marloth* 16628; Noordhoek Forest, *Lotsy & Goddyn* 1599 and 1662 (L); Die Kommetjie, *Lam. & Meeuse* 4200B (L). Without locality, *Sieber* 219 and 220 (cited in Fl. Cap., former under *O. laurifolia* and later under *O. capensis*, two sheets of each) (L); Simons Bay, *Macgillivray* 665 (K). Paarl: Berg River, source on mountain slope, *Pillans* 8129 (BOL); Happy Valley, Bains Kloof, *Esterhuysen* 12820 (BOL); French Hoek, *Hubbard* 307 (BOL). Ceres: Mitchell's Pass, *Andreae* 214; *Bond* 9 (BOL); exact locality? *Thode* A2268 (leaves small in 3 last named specimens; same tree in Mitchell's Pass?). Tulbagh: between Nieuwekloof and Elandskloof, Twenty-four Rivers, *Drege* s.n.* (type gathering of *O. concolor* E. Mey., 3 sheets in Ryksherbarium, Leiden (L); E. & Z. 77·9 (that is along same route as Drege, passing Nieuwekloof). Piquetberg: Kapiteins Kloof, at base of mountain, *Pillans* 8024, 2 sheets, one fruiting, one flowering (BOL); [*Pillans* 7887 (BOL) from " upper slopes of Kapiteins Kloof " may belong here, distinct appearance suggests hybrid, needs investigation]; Pikeniers Kloof, *Zeyher* s.n. (looks like same collection as the following specimen *Zeyher* 1150) (BOL); *Zeyher* 1150, 3 sheets, cited in Fl. Cap. under *O. laurifolia* var. *concolor* (BOL). Clanwilliam: Grasruggens Nek, *Pillans* 8716.

Not known to occur outside South Africa.

This subspecies includes a large number of specimens from the coastal regions of the Cape, stretching from the borders of Natal southwards and westwards to the Peninsula and northwards to Clanwilliam. The leaves of the specimens vary very much in texture, shape and size, but all attempts at grouping specimens with more or less similar leaves failed completely. This was not only because intermediates are found between all extremes, but also because the variations in leaves do not combine with any other feature to form a recognisable group.

* The specimen in the National Herbarium, Pretoria, supposed to be the same Drege gathering, is not an Olea.

Of the name changes necessary in this revision the one that will cause some upset and needs explanation is the sinking of *O. laurifolia* Lam. under *O. capensis*. This is because (1) the features given as the distinguishing characters seem to work well, since some specimens have leaves broadly obtuse while others narrow to a sub-acute or acute apex, and (2) the name *O. laurifolia* has wrongly come to be applied to the forest tree here classified as *O. capensis* subspecies *macrocarpa*. The leaves of this forest tree are somewhat similar in shape to those of several specimens from the Peninsula which would fall under *O. laurifolia* Lam. (cfr. figs. 8a and b with leaf shapes on fig. 10), but the fact that the forest tree produces large elliptic fruits is, in my opinion, more diagnostic than similarity in leaf-shape. The figure of *O. laurifolia* cited by Lamarck (tracing of a leaf and fruit of this figure is reproduced here, see fig. 6b) is described by Burman (Rar. Afr. pl. 233) as having " thick " leaves which are " almost sessile " and " rotund fruits " of the size of the drawing, all of which does not describe the forest tree (see for instance its long petioles, pl. 20). Throuhgout the 200 odd years of collecting no specimens with fruits larger than the one figured has been collected anywhere in the Cape except in the forests at Knysna or similar forests to the east. Therefore the name *O. laurifolia* Lam. cannot be applied to the forest tree with large fruits.

Having settled this point, it still remains to be explained why *O. laurifolia* cannot be separated from *O. capensis* at least as a variety. The examination of the types of the two species (Pl. 16 and 17) and of the drawings of leaves from a number of specimens collected in a fairly circumscribed area at or near Kirstenbosch (Fig. 7 and 8), will help to elucidate this. From each specimen two leaves were drawn, a small and large one. On Fig. 7, a and b, the small leaves are very similar but in the one case (Fig. 7a) they develop into a leaf with a very broad apex (like typical O. capensis, see Fig. 6a), and in the other (Fig. 7b) into a leaf which narrows slightly to a blunt point, very like typical *O. laurifolia* (see Fig. 6b). Similar pairs of leaves from different plants in the Kirstenbosch area show an even greater diversity in the shape of the full grown leaf than those of the types (see Figs. 8a–g and compare with photos of the types on plates 16 and 17). All these specimens whether small- or large-leaved, rounded or acute at the apex, wavy or not on the margins, are considered by the local botanists, who know the growing plants, to belong to a single species. In the same way taxonomists working with the pressed specimens have found it impossible to group them and distinguish the groups from each other. Among these heterogeneous specimens or within their range of variation would fall the type of *O. undulata* Jacq. (see Fig. 6c) which was sunk under *O. laurifolia* in the Flora Capensis and now is a synonym of *O. capensis*.

It was not quite so easy to decide whether *O. concolor*, from Tulbagh, is synonymous with *O. capensis*. The isotypes, Drege s.n., which were seen among the specimens sent on loan from Kew and the Ryksherbarium, Leiden, look rather distinct (see Pl. 18 and Fig. 8c). Most of the leaves are rather small, broadest in the upper half, long cuneate to the base and abruptly narrowed near the apex into a cusp-like acumen. After examining all other available specimens from the regions north of the Peninsula, it was obvious that here too were odd variants that could not be grouped together (see Fig. 8c–g). To illustrate, Wright in the Flora Capensis cites under *O. laurifolia* var. *concolor* Harv., with the type (Drege s.n.) a specimen *Zeyher* 1150 from Piquetberg. This latter specimen has a long leaf, broadest about the middle and long tapering to base and apex (see Fig. 8d), quite unlike the type of *O. concolor*. From Piquetberg came also two specimens, *Pillans* 7887 (see Fig. 8e) " from upper slopes ", with leaves very like the type of *O. concolor*, and *Pillans* 8024, from " base of mountain ", with very different leaves (see Fig. 8g). From Clanwilliam, the most northerly locality known, comes yet another form of leaf (see Fig. 8f). Most of these specimens from the northern districts, with the possible exception of Pillans 7887 which should be investigated (especially from the point of view of possible hybridization with *O. exasperata*), are best included as variants in the complex subspecies *O. capensis* L. subsp. *capensis*.

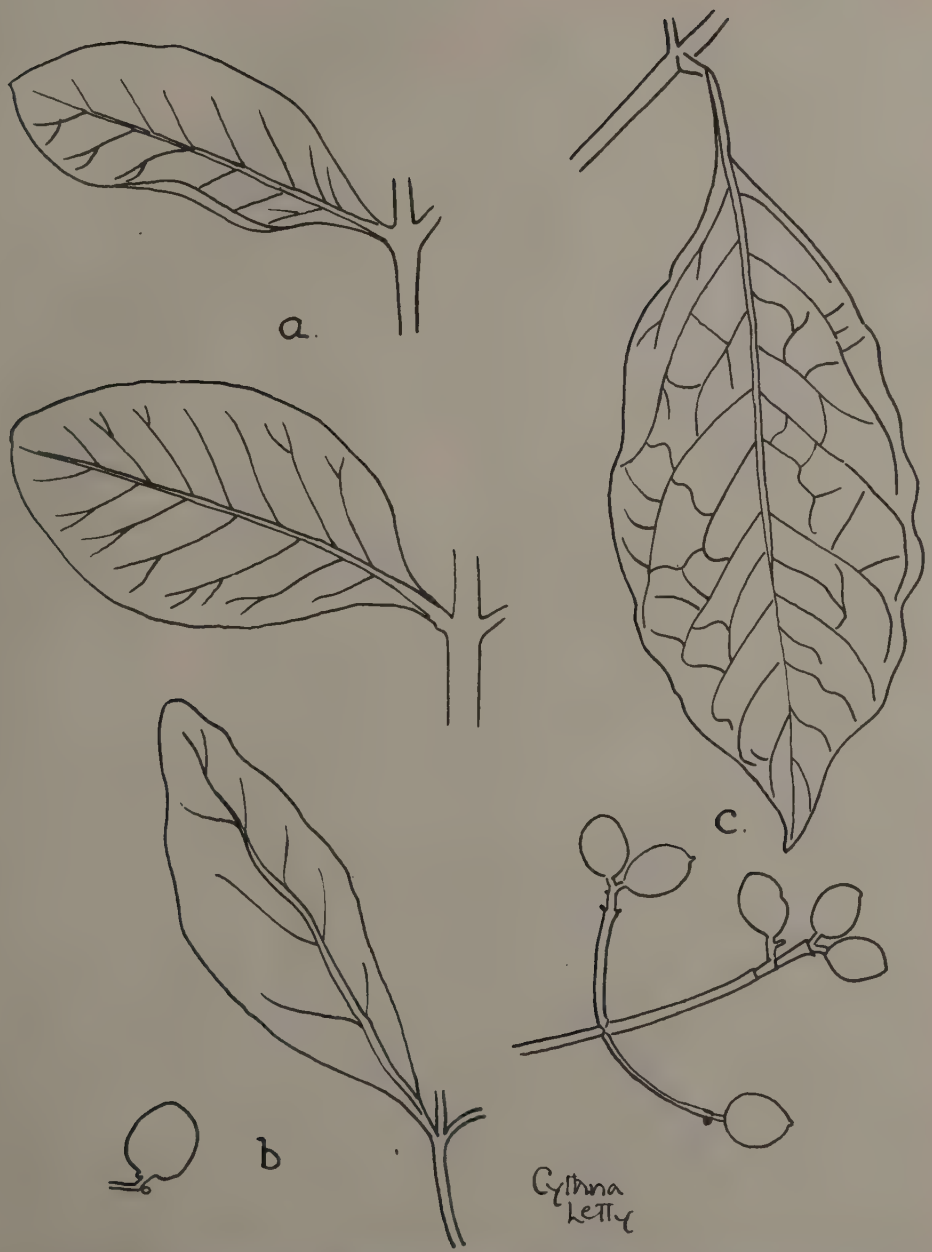

FIG. 6.—Olea capensis L. subsp. capensis; *a*, leaves from the figure in Dill. Elth. t. 160, cited with the original description of O. capensis L.; *b*, leaf and fruit from the figure in J. Burm. Rar. Afr. Pl. t. 81, fig. I, cited with the original description of O. laurifolia Lam.; *c*, leaf and fruiting inflorescence from the figure in Jacq. Hort. Schoenbr. I, I, t2, the type figure of O. undulata Jacq.

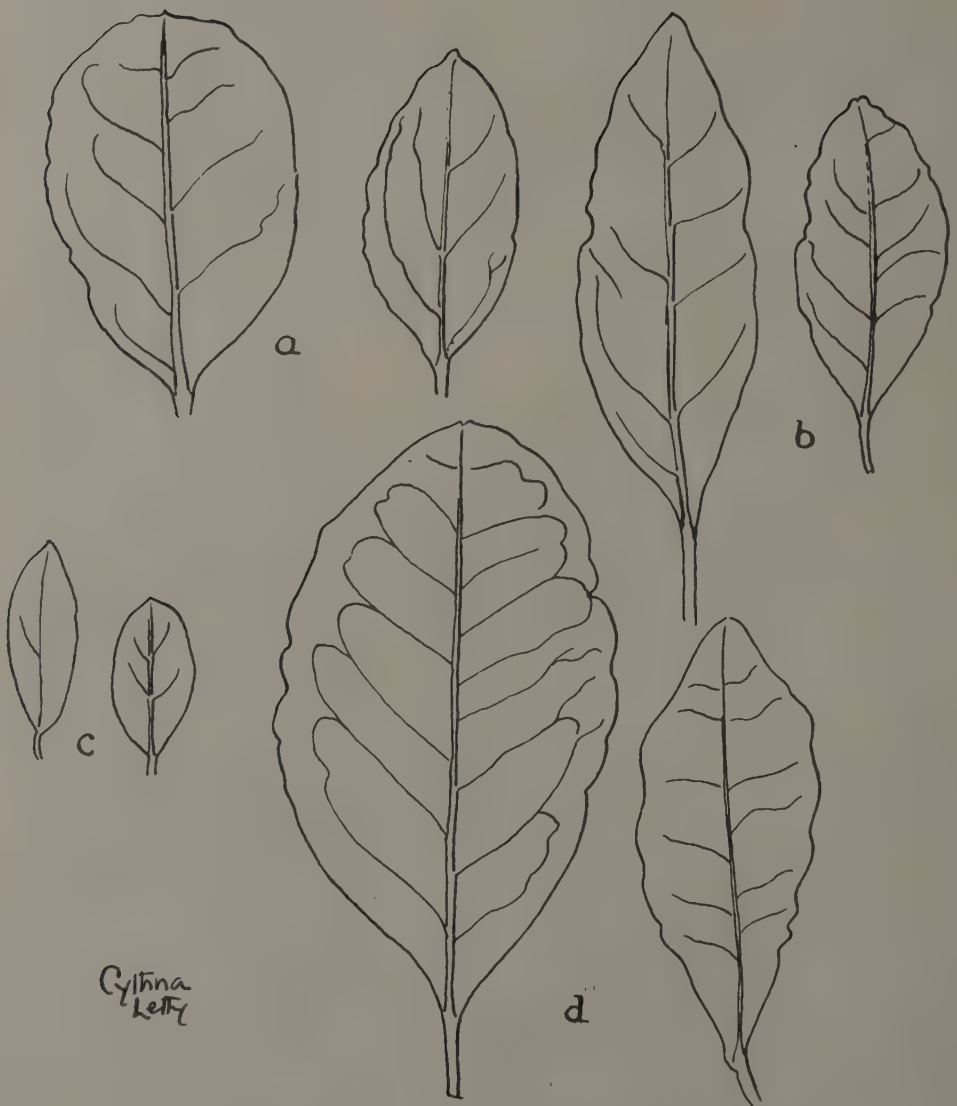

FIG. 7.—Olea capensis L. subsp. capensis. Samples of leaf-shapes from specimens growing on the Peninsula, 2 from each specimen, to show the range of variation; *a*, Drege s.n. Table Mountain; *b*, E. & Z., mountains round Cape Town; *c*, Esterhuysen 12853, Kirstenbosch; *d*, Esterhuysen 11744, Kirstenbosch.

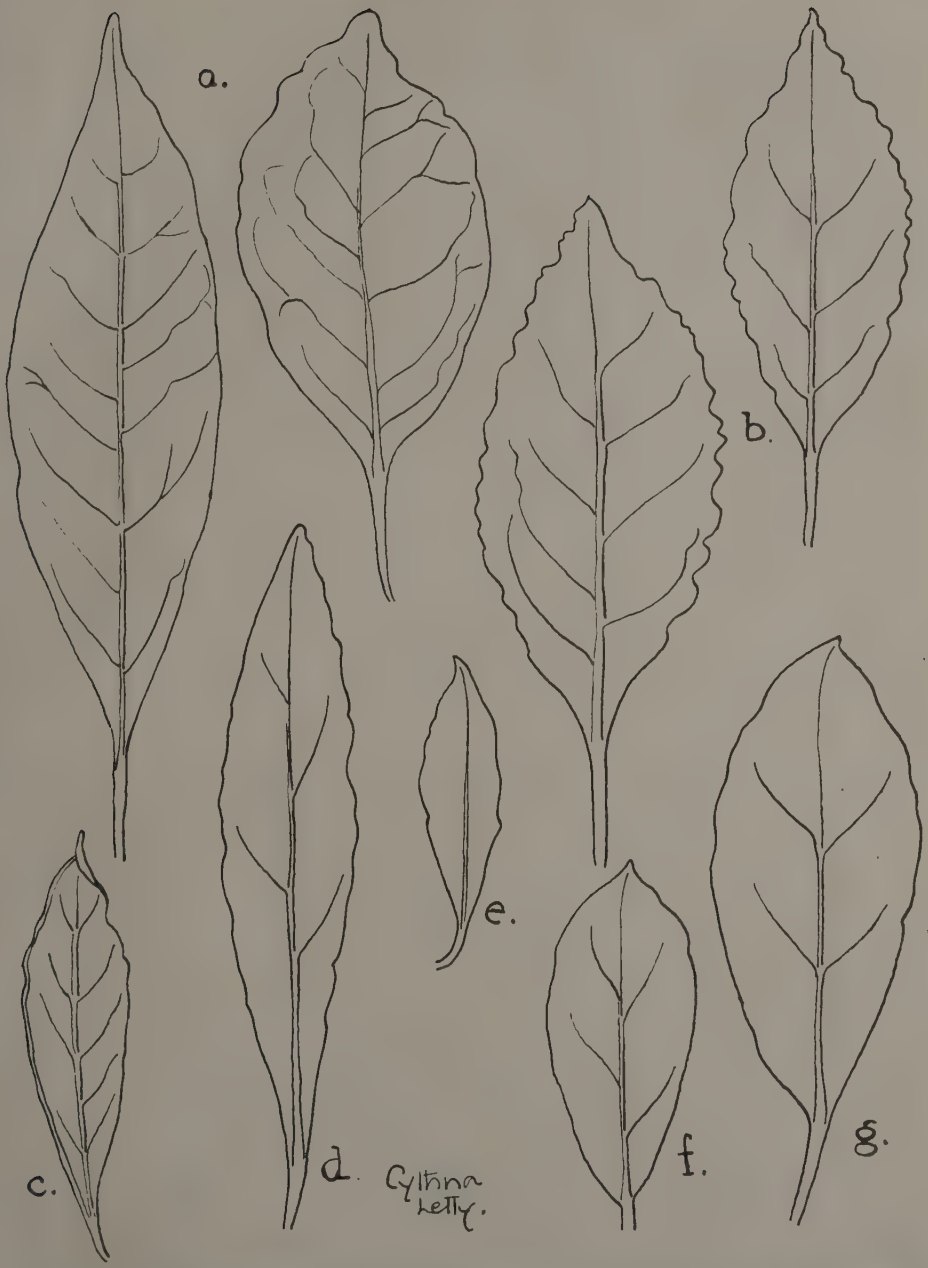

FIG. 8.—Olea capensis L. subsp. capensis. Examples of various leaf-shapes; *a*, two leaves, Smuts 1100, Groote Schuur; *b*, Marloth 5662, Table Mountain, like "O. undulata"; *c*, isotype of O. concolor, Drege, Tulbagh district; *d*, Zeyher 1150 cited in Fl. Cap. as "var. concolor"; *e*, Pillans 7887, Kapiteins Kloof, Piquetberg; *f*, Pillans 8716, Clanwilliam; *g*, Pillans 8024, also from Kapiteins Kloof.

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Besides the variants from Kirstenbosch and the northern districts, there are others that could be mentioned, such as the specimens with pointed fruits, that seem to occur haphazardly, and certain growth forms.

Among the latter is a low, shrubby, sea-side form described in one instance by the collector, John Phillips, as an " impenetrable hedgelike consocies 12–36 in. high ". The leaves on such plants are usually large and thick and broadly rounded at the apex. Investigation with the help of Forest Officers shows that the appearance is probably caused by environment and in the early stages of growth. The particular patch described by John Phillips as 12–36 in. high is today, 20 odd years after, 6 to 8 feet high with smaller leaves, while a little deeper inland are small trees that link this form with the normal tree.

With regard to the common name, the most generally used is " Black Ironwood ". A record exists that in the Tzitzikamma it is known as " Lemoen Ysterhout " owing to the yellowish colour of the underside of a fresh leaf. This yellow colour of the leaf-undersurface is probably another example of the variations possible in this subspecies; the notes usually describe the leaves as lighter on the undersurface, but there are quite a number which are reported to have concolorous leaves while in a few cases they are described as purplish beneath.

(*b*) subsp. **enervis** (*Harv.*) *Verdoorn* stat. nov., *O. enervis* Harv. in Wright in Fl. Cap. 4, 1: 488 (1907); *O. laurifolia* Harv. ex Wright in Fl. Cap. 4, 1: 487, in part (*Wood* 500) non Lam.

The essential features by which to distinguish this subspecies are the flatter leaves of more uniform size and shape (compare drawings in Fig. 9 with those in Figs. 7, 8 and 10), on the average broadly elliptic, very rarely oblong elliptic, 4–5 cm. long and 1·5–2·5 cm. broad; the short petiole; pale branchlets; lower leaves on herbarium specimens deciduous, leaving prominent scars; and the midrib usually prominent only in the basal half on the undersurface.

PLATE 19 & FIG. 9.

Type: *Gerrard* 1151, from between the " Buffalo River and Mooi River ", that is probably in the Msinga district, Natal.

TRANSVAAL.—Soutpansberg: near Lake Funduzi, *Gillett* 3085 (BOL); *Story* 4857. Pietersburg: Blaauwberg, *Codd* 8694; 8695; *Codd and Dyer* 9001; *Bremekamp* and *Schweickerdt* 112. Rustenburg: Breedtsnek, *Repton* 3905; Pisangkloof, *Rose-Innes* 23254 (J). Brits: Kloof in Magaliesberg opposite Wolhuterskop turn-off, *Story* and *Rose-Innes* 1392; *Marais* 279 and 285. Waterberg: Groothoek, *Codd* 3955; Hangklip, *Maguire* 1441 (BOL). Potgietersrust: near Potgietersrust, *Galpin* 8827; between Potgietersrust and Palala, *Pole Evans* s.n.; S.E. of Palala, *Story* 1667; Bokpoort, *Codd* 2364; *Galpin* 11685. Lydenburg: Sekukuniland, *Barnard* 502; 270; *Barnard and Mogg* 80, 768, 1003; *Mogg* 16908; 16888; *Moss* 22464; *Van Warmelo* 93; 105; Steelpoort, *Keet* in F.D. Herb. 6058; Mooihoek Chrome Mine, *Codd & Dyer* 7701. Barberton: between Louws Creek and Maid of the Mist Mountain, *Hutchinson* 2434; Rimers Creek, *Thorncroft* 2005; Berlin Plantation, *Keet* 6728; *Thode* A1622, leaves rather too long acuminate?

SWAZILAND.—Lebombos, east side, *Hornby* 2830.

NATAL.—Ingwavuma: *Gerstner* 3774 (NH); Melmoth: Entonjaneni, *Gerstner* 2685 (NH). Nkandhla: Qudeni, *Gerstner* 3572, one specimen on sheet with all small leaves, as on type specimen, (NH), *Davis* 113 (NH). Weenen: Umhlumba Mountain, west slopes, *Acosks* 10615; Blaauwkrans River, *Pentz* 218. Msinga: Buffalo River and Mooi River, *Gerrard* 1151, holotype (K); isotype, the majority of leaves small, (PRE). Eshowe: Ngoya, *Boocock* in F.D. Herb. 5992. Ndwedwe: Inyoni Hill, *Oliver* 502; Inanda, *Medley Wood* 500 (cited in Fl. Cap. under *O. laurifolia*). Pinetown: Umzinyati, *Medley Wood* 11443. Port Shepstone: Lower Umzimkulu, *Medley Wood* 11596, 9982 (NH).

Not known to occur outside South Africa.

This subspecies occurs in the bushveld of the Transvaal and Swaziland and the dry inland regions of Natal. Although falling within the range of characteristics of O. capensis L., specimens from these regions show a certain similarity in general appearance that makes them distinguishable from the rest. Because the differences are merely differences of degree and because occasionally specimens from the eastern Cape are almost indistinguishable this group has been given the rank of subspecies.

The type specimen of *O. enervis* Harv., that is now the type of this subspecies, Gerrard 1151 (see Fig. 9a), has leaves on the whole smaller than the average (see Fig. 9c–f), but they are within the range of size and may be matched with one or two of the leaves on any average specimen of the subspecies.

Gerrard 1151 was collected between the Buffalo and Mooi Rivers in Natal, that is probably in the Msinga district which lies between the Weenen and Nkandhla districts, from which specimens obviously belonging to this group have been collected, for instance Gerstner 3572, collected at Qudeni, Nkandhla.

The majority of the leaves on the flowering branches of Gerstner 3572 are small like those on the type specimen (see left hand leaf of Fig. 9b), while on a branch on the same sheet most of the leaves are much bigger (see right hand leaf of Fig. 9b). Fig. 9c depicts an average leaf from a specimen from Weenen and Fig. 9d is of a specimen from Rustenburg in the Transvaal. Lastly Figs. 9e and 9f are drawings of representative leaves from two different specimens collected on the Blaauwberg.

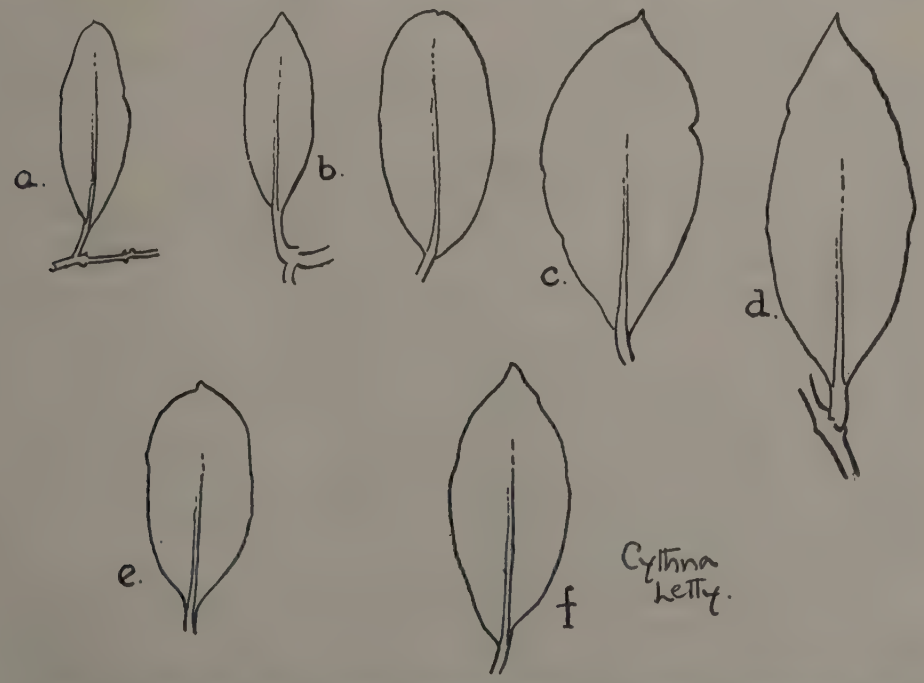

FIG. 9.—Olea capensis L. subsp. enervis (Harv.) Verdoorn. Examples of leaves showing range in size and shape; *a*, leaf from type specimen, Gerrard 1151, between Buffalo and Mooi Rivers, Natal; *b*, two leaves from Gerstner 3722, Qudeni, different size and shape from same gathering; *c*, Acocks 10615, Weenen; *d*, Codd 2364, Bokpoort; *e*, Codd 8695, Blaauwberg; *f*, Codd 8694, Blaauwberg.

A single specimen Gillett 3085 from near Lake Funduzi, has rather unusual leaves, being mostly narrowly oblong, rounded at apex and base and with the midrib prominent. Investigation has proved that this specimen, which is in the Bolus Herbarium, is not representative of the trees there, the leaves of which are on the whole more typical. Another specimen that differs somewhat from the general pattern is a specimen from Barberton, Thode A1622, in which the leaves are rather long acuminate to an acute apex.

(*c*) subsp. **macrocarpa** (*C.H. Wr.*) *Verdoorn*, stat. nov. *O. macrocarpa* C.H. Wr. in Fl. Cap. 4, 1: 1129, addenda, (1909) and in Kew Bull. p. 186 (1909). *O. laurifolia* Sim, Forest Flora of C.C. 264, t. 106 (1907) pro parte, fig. incl.; Harvey ex Wright in Fl. Cap. 4, 1: 487 (1907) pro minore parte e.g. Burchell 5225; J. Phillips in Trans. of the Royal Soc. of S. Africa, 16: 170 and 180 (1928); Acocks in Veld Types of S. Africa p. 36 and 122 (1953), non Lam.

Forest trees, sometimes up to 90 feet tall, ultimate branchlets slender (in herbarium specimens branchlets somewhat longer and more slender, with leaves less crowded than specimens of " subsp. capensis "). *Leaves* usually narrowly elliptic, tapering to the base and apex, sometimes fairly broad a shortly acuminate to base and apex, 5–10 cm. long and 1–3·5 cm. broad; apex often acute with subulate point, sometimes obtuse; petiole 1–2 cm. long, often dark in lower half (purple when fresh?) usually patently spreading. *Panicles* many flowered but not very compact. *Calyx* shortly 4-toothed, lepidote-pitted, minutely ciliate. *Fruit* purple when mature, 1·5–2 cm. long and ·6–1·1 cm. diam.

Plate 20 and Fig. 10.

Lectotype: *Grenfell* 869 (K), Pilgrims Rest, Transvaal. This specimen has been selected as type from the two cited by C. H. Wright in the original description of O. macrocarpa because it bears fruits and the size of the fruit is the principal distinguishing feature.

Transvaal.—Soutpansberg: Hanglip, *Gerstner* 6015. Letaba: Woodbush, *D.F.O.* in F.D. Herb. 4329 (syntype of O. macrocarpa C.H. Wr.); 541; 1129; 3272; *Botha* in F.D. Herb. 3560; *O'Connor* 1920. Pilgrims Rest: forest near Pilgrimsrest, *Grenfell* 869 (lectotype); Marieps Kop, *Keet* 1393 in F.D. Herb. 5971; *forester* in F.D. Herb. 8101; 9386.

Natal.—Hlabisa: Hluhluwe Reserve, *Ward* 2247. Nkandhla: Qudeni Forest, Bayer 811; 804; 805.

Cape.—Tabankulu: Tabankulu Forest, *Kriel* in F.D. Herb. 6129. Lusikisiki: Ntsubane Forest, *Fraser* in F.D. Herb. 6042. Stutterheim: Fort Cunymghame, *Sim* 2104. Humansdorp: Storms River Forest, *forester* in F.D. Herb. 4083; Zahn in F.D. Herb. 4026. Knysna: Deepwalls Forest, *Keet* 917, in F.D. Herb. 3939; *Keet* in F.D. Herb. 2590; 4085; 4086; *Schonland* 3595 (GRA); *Laughton* in F.D. Herb. 8400; 8399; *Phillips* in F.D. Herb. 7356; forest near Kaatjies kraal, *Burchell* 5225 cited in Fl. Cap. under *O. laurifolia* (GRA, K); forest, *Lam and Meeuse* 4723 (L). [Within bounds of possibility, *Burchell* 7227, Grootvadersbosch, Swellendam, belongs here but leaves small and inflorescence very immature.]

Not known to occur outside S. Africa.

This subspecies has been found in the Transvaal, Natal and the eastern Cape as far west as Knysna, and it is confined to the forest patches in these areas. According to plant geographers, forest was much more extensive in South Africa 300 years ago than it is now. Today only patches remain, some in the Transvaal, for example at Woodbush and Marieskop, in Natal, as at Qudeni, the Transkei, at Tabankulu, and the well known patches at Knysna and George. Some less well known patches may be found further west, such as the one at Grootvadersbosch in the Swellendam district. In the north eastern areas these forests are on the mountain ranges but in the south they are along the coastal belt.

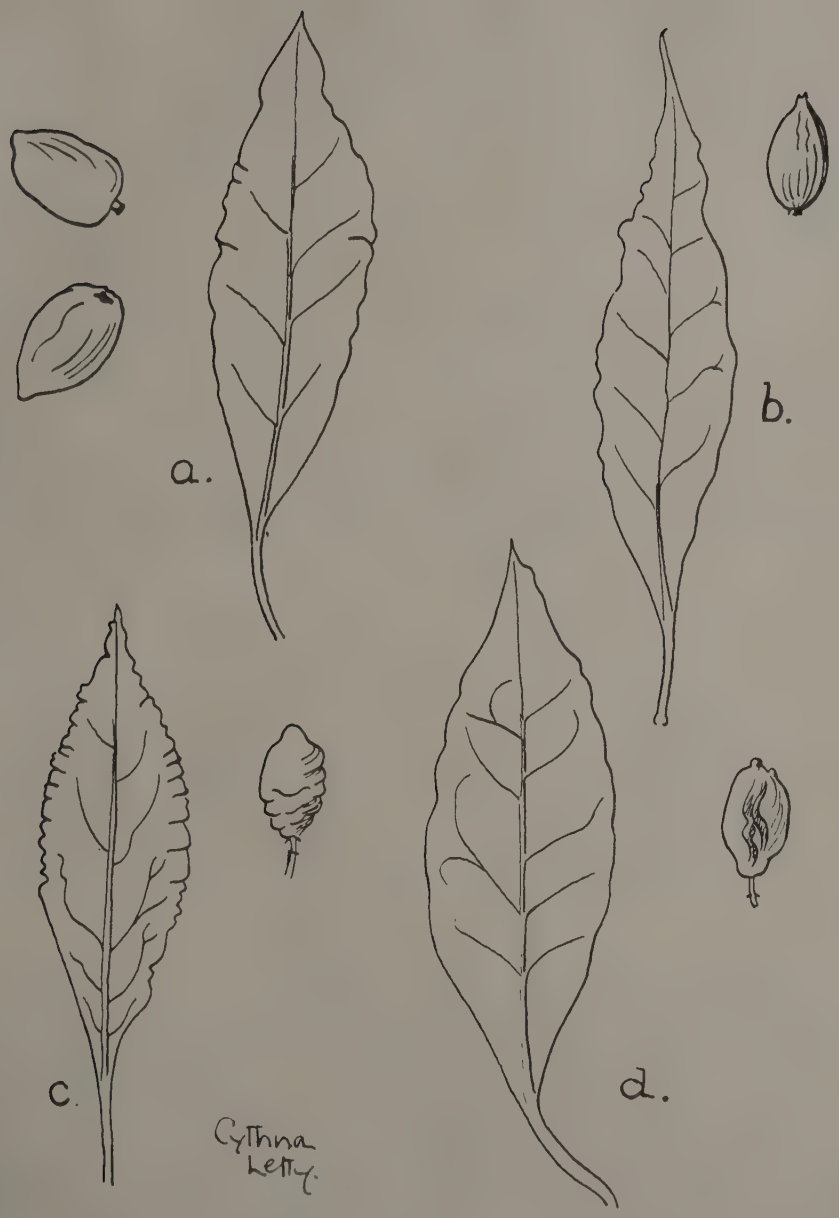

FIG. 10.—Olea capensis L. subsp. macrocarpa (C.H. Wr.) Verdoorn; *a*, leaf and fruits from isotype, Pilgrimsrest; *b*, specimen from Marieps Kop; *c*, specimen from Hluhluwe, Natal; *d*, specimen from Knysna.

The identification of the forest trees at Knysna, which bear large fruits and which had erroneously come to be called *O. laurifolia*, with *O. macrocarpa* C.H. Wr. of the Transvaal, is fully supported by Dr. John Phillips who, as an officer of the Department of Forestry stationed at Knysna, wrote the following in 1928: " The foliage of the so-called *O. macrocarpa* C.H. Wr. from the Zoutpansberg, anatomically is indistinguishable from that of *O. laurifolia* [meaning the forest tree with large fruits]. This fact, together with the similarity in the anatomy of the ' bark ' and the similarity in the flowers and fruits, leads the writer to think that the plants are co-specific " (Trans. Roy. Soc. of S.A. 14: 179).

In the Knysna forest, subsp. *capensis* overlaps in its distribution with subsp. *macrocarpa*. There do not seem to be any notes by foresters or forest officers about hybridization but there are remarks about the difficulty of distinguishing between the two, which they referred to as " *O. capensis* " and " *O. laurifolia* " respectively.

In the same paper mentioned above Phillips writes: " The foliage of *O. laurifolia* and *O. capensis* [meaning subsp. *macrocarpa* and subsp. *capensis*], in the absence of flowers and fruits, is often confused by botanists and foresters. The leaves of these species are readily distinguished in that the walls of the dorsal epidermal cells of *O. laurifolia* (sic) present a definitely wavy appearance in superficial section whereas *O. capensis* shows stouter non-wavy walls ".

As pointed out in this work there is a great deal of variation in subsp. *capensis* and in many cases, when it was thought that features had been found by which to separate it from subsp. *macrocarpa*, when still more material had been examined it was found that the differences did not hold. In like manner the feature of the wavy cell walls found by Dr. Phillips might break down if a large number of specimens are examined.

The similarity of the leaf shape in subsp. *macrocarpa* with a few specimens of subsp. *capensis* can be seen if those on Fig. 10 are compared with some on Figs. 7 and 8. (Compare Fig. 10a, a drawing of a leaf and fruit from the isotype of subsp. *macrocarpa* in the Bolus Herbarium with the leaf-shape of Fig. 8a, *Smuts* 1100, from Groote Schuur).

The leaf, Fig. 10b, from a Mariepskop specimen, shows the attenuate point that is quite frequently found in this subspecies, but never in subspecies *capensis*. In this character it approaches the leaf-shape of *O. woodiana* (see Fig. 4). It will be seen from the 4 figures on Fig. 10 that in subsp. *macrocarpa* there is more uniformity of leaf-shape than in subsp. *capensis*.

The common name " Ironwood ", " Ysterhout ", is usually applied to subsp. *macrocarpa* but sometimes it is also called " Black Ironwood ", the common name for subsp. *capensis*.

4. LINOCIERA.

Sw. in Schreb. Gen. Pl. 2: 784 (1791) nomen conservandum. Benth and Hook. in Gen. Pl. 2, 2: 678 (section Ceranthus); Bkr. in Fl. Trop. Afr. 4, 1: 19 (1904); Turrill in F.T.E.A. (1952). *Olea* Phill. Gen. S.A. Fl. Pl. ed. 2: 572 (1951) in part, not Linn.; Harvey ex Wright in Fl. Cap. 4, 1: 485 (1907) in part. *Dekindtia* Gilg in Bot. Jb. 32: 139 (1902); Turrill in F.T.E.A. (1952). *Campanolea* Gilg & Schellenb. in Bot. Jb. 51: 73 (1914).

Trees, small to large forest trees. *Leaves* variable in size and texture, often large, usually oblong to elliptic or obovate-oblong, opposite, entire, minutely and sparsely lepidote, especially on undersurface, usually with acarodomatia in the axils of the veins beneath. *Inflorescence* axillary, often on previous as well as on this years growth, cymes sessile or more often paniculate and laxly flowered, peduncles sometimes reduced or absent giving the impression of fascicled inflorescences; pedicels also sometimes reduced and flowers then appear glomerate. *Calyx* deeply lobed sometimes to the base, lobes broad to rounded at the apex, densely setulose pubescent to glabrous

without. *Corolla* with a very short tube or lobed to the base, sometimes lobes cohering in pairs (with stamen inserted between them) but tube slit to the base between the pairs; lobes with margins deeply infolded and so usually appearing longer than broad, cucullate at the apex (in African species). Stamens 2 (rarely 4 found in some flowers), anthers shorter than the corolla-lobes (in African species; as long as, and enveloped by the corolla-lobes, in the typical species); anther basifixed. *Ovary* sometimes hispid, subglobose, narrowed into a short style, sometimes up to as long as, or slightly longer than the ovary; stigma sub-capitate, obscurely bi-lobed; ovules collateral, attached ventrally (in typical Linociera attached at apex). *Fruit* a drupe with a thin fleshy layer, endocarp rather hard and with a large seed cavity; seed usually solitary, no endosperm, cotyledons thick.

FIG. 11.

Type species: L. ligustrina Sw., from the West Indies.

The above generic description was drawn up from all available tropical African as well as South African material because the species throughout Africa form a definite group and obviously belong to the same genus. This group and the features by which it differs from Olea were obviously not recognised by past workers. For instance (1) several members of the group were originally in the genus *Olea*, such as *O. foveolata* and *O. peglerae* in South Africa; (2) one typical *Olea* in tropical Africa was at one time in the genus *Linociera*, *O. welwitschii* (Knobl.) Gilg & Schellenb.; and (3) recently in the Flora of Tropical East Africa, where *Olea* and *Linociera* are both maintained, a species which fits best in the latter genus is included in the former, *O. mildbraedii* (Gilg and Schellenb.) Knobl.

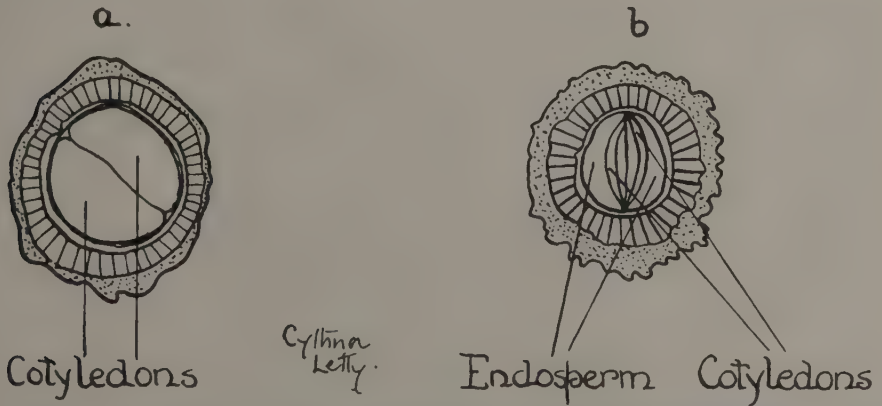

FIG. 11.—Transverse sections of fruits; *a*, Linociera battiscombei, showing thick cotyledons and no endosperm; *b*, Olea capensis L. subsp. macrocarpa, showing thin cotyledons in endosperm.

The question as to which of the two genera this group should belong is a moot one. The species comprising it are no more typical of *Linociera* than of *Olea*, but could form a section in either or constitute a separate genus. The reasons for here putting them under *Linociera* rather than *Olea* are because (1) both in Africa, including the Mascarenes, and in the East (India, Burma, China and New Guinea, etc.), similar specimens are placed in this genus (see especially Flora of Tropical East Africa, 1952), and (2) in Bentham and Hooker's General Plantarum this group cannot be put under *Olea* on account of the ex-albuminous seeds, whereas it can be fitted into the section *Ceranthus* of *Linociera*.

The decision to leave the group under *Linociera* instead of giving it generic rank was made because, to take the latter course, would require an investigation of all the synonyms and related genera and an examination of specimens of *Linociera* in both the Old and the New World. Since this is not possible at this stage, the group is characterised and defined as clearly as possible and is treated in such a way that any future worker will be able to move it as a whole to whatever position in the family he considers the correct one. The combination of characters used in the key to separate this group in *Linociera* from the genus *Olea* seem to be sound and divide the specimens into two natural classes. In one species from tropical Africa, *Linociera latipatala* M. R. F. Taylor, one of the most useful distinguishing characters breaks down to a certain extent, the corolla segments are not much longer than broad but the other characteristics are present, such as acarodomatia on the leaves, the infolded margins of the corolla lobes and the ventrally attached ovules. There can be no doubt that in spite of this one feature it belongs to the group under discussion. This species was the basis for Gilg and Schellenberg's monotypic genus *Campanolea* and was described by them as *Campanolea mildbraedii* in 1913. In 1932 it was transferred to *Olea* by Knoblach. In 1940 Taylor described *Linociera latipetala*, which is obviously the same species and which Turrill cites together with *Campanolea mildbraedii* as a synonym of *Olea mildbraedii* (Gilg and Schellenb.) Knobl. Since there is already a *Linociera mildbraedii* Gilg and Schellenb., under this genus it becomes *Linociera latipetala* M. R. F. Taylor. Having access to the specimen *Dummer* 5473 which is cited by Taylor, this study of the species was made possible and provided the authority for sinking the genus *Campanolea*.

If future workers decide on giving this group generic rank it is possible that Dekindtia will be found to be the first generic name applied to a member of the group [see discussion under *Linociera battiscombei* (= *Dekindtia africana*)].

Key to Species.

Inflorescence a few- to several-flowered axillary cymose panicle:
- Leaves on flowering branches rarely more than 7 cm. long, if longer then under 3 cm. broad ..... 1. *L. foveolata*, (aggregate sp.).
- Ultimate twigs glabrous, if somewhat pubescent leaves more than twice as long as broad:
  - Small trees up to 30 feet tall, fruit up to 2 cm. long; leaves usually more than twice as long as broad.. 1a. subsp. *foveolata*.
  - Forest trees up to 90 feet tall; fruits up to 2·7 by 2 cm.; leaves usually not more than twice as long as broad ..... 1c. subsp. *major*.
- Ultimate twigs tomentulose; leaves not usually twice as long as broad mostly ending in a broad acumen with recurved or retuse apex ..... 1b. subsp. *tomentella*.

Leaves on flowering branches usually 9–13 cm. long, often broadest in upper half, narrowing gradually to the base, shortly acuminate to the apex and abruptly narrowed into a broad obtuse 5–10 mm. long acumen; petioles 1 cm. or more long ..... 2. *L. peglerae*.

Inflorescence a reduced cyme with flowers sub-sessile and appearing glomerate in the leaf axils; young inflorescences densely pubescent sessile globules; calyx segments up to 4·5 mm. long; trop. African species ..... 3. *L. battiscombei*.

1. **L. foveolata** (*E. Mey.*) *Knobl.*, aggregate species.

   (*a*) subsp. **foveolata.**

   (*b*) subsp. **tomentella** *Verdoorn* subsp. nov.

   (*c*) subsp. **major** *Verdoorn* subsp. nov.

Small trees, sometimes up to 30 feet tall or forest trees up to 90 feet tall. Ultimate twigs short, usually with 2 pairs of leaves, glabrous, or tomentulose. *Leaves* varying in size and texture, glabrous or sparsely pubescent at base and on midrib, ovate-oblong, oblong-elliptic, or oblong, rounded or shortly cuneate at base (in coppice shoots rounded to cordate at base), shortly or gradually narrowed to an obtuse apex, or with a broad, sometimes retuse, acumen at apex, 2–7 cm. long (if longer then under 3 cm. broad) and 1·3–3·7 cm. broad, very minutely and obscurely scaly, especially on lower surface, appearing as if minutely pitted, acarodomatia usually present in the axils of the leaves below; petiole 2–7 mm. long. *Inflorescence* short, laxly flowered, cymose panicles, axillary and on the old wood, glabrous, or bracts and calyces setulose, glabrescent, 0·5–3 cm. long, peduncles sometimes reduced, giving the appearance of fascicled inflorescences. *Calyx* 4-lobed to beyond the middle; lobes rounded at the apex, usually ciliate. *Corolla* white sometimes tinted pink, sweetly scented, 4-lobed almost to the base and between alternate lobes right to the base; lobes about 4 mm. long with margins deeply infolded and apex cucullate (like a mocassin toe), appearing longer than broad. *Stamens* normally 2 (4 found in some flowers), inserted on the short tube between alternate lobes, filaments fused on corolla-tube and only slightly longer than it; anthers about 1·75 mm. long and 1·5 mm. broad. *Ovary* subglobose, stigma subcapitate, obscurely 2-lobed; ovules 2, attached ventrally, usually near the base. *Fruit* green turning blackish or purplish black when mature, sub-globose to oblong, 1·5–2·8 cm. long and 0·8–2 cm. broad.

The aggregate species, *Linociera foveolata*, is characterised by the comparatively small leaves, seldom over 7 cm. long but if so then under 3 cm. broad and the laxly flowered, glabrescent, axillary panicles, usually 1 to 3 cm. long.

This species divides naturally into 3 groups and these groups have been given the rank of subspecies because although distinguishable seem to be more closely related to each other than to the other species of *Linociera*, also the distinguishing characters occasionally grade into each other and while in general it will be easy to decide to which subspecies a specimen belongs there will be some cases when it will not be possible, although the specimen could doubtlessly be classified as *L. foveolata* in the broad sense.

The distribution of the three subspecies can be seen on the map reproduced here as fig. 12.

(*a*) subsp. **foveolata.** *L. foveolata* (E. Mey.) Knobl. in Repert. Nov. Spec. 41: 151 (1937); *Olea foveolata* E. Mey. Comm. Pl. Afr. Austr. 176 (1837); DC. Prod. 8: 285 (1844); Harv. ex Wright in Fl. Cap. 4, 1: 485 (1909) pro parte; *L. marlothii* Knobl. in Repert. Nov. Spec. 41: 151 (1937).

The typical subspecies is distinguished by its glabrous or sparsely pubescent branchlets, never tomentulose; its leaves usually more than twice as long as broad, shortly acuminate to an obtuse apex; and the fruit usually under 2 cm. long and 1·1 cm. broad but not larger.

PLATES 21 AND 22.

Type: Drege s.n., from " between Hoffman Kloof and Driefontein " in the Zuurbergen, Uitenhage. Type of synonym: *L. marlothii*, Knobl., *Rudatis* 1416, Dumisa, Natal.

TRANSVAAL.—Lydenburg: Waterfall, *Codd & Verdoorn* 7613; Groblersdal: Loskop Dam, *Codd* 8434. Rustenburg: near Ananda Guest Farm, *Rose Innes* 207, 211,286; *Marais* 280, 281, 286. Brits: Magaliesberg, opposite Wolhuterskop turn off, *Marais*.

NATAL.—Ingwavuma: Gwoloweni Forest, *Bayer* 765. Entonjaneni: Umhlatuzi Valley, *Lawn* 1925 and 1927, fruit rather large, 2 cm. long and 1·2 cm. broad (NH). Estcourt: Dalton Bridge, *Wright*, *West* and *Acocks* 12; Umhlumba Mountain, *West* 1463; Tabamhlope, *West* 1135. Ndwedwe: Groenberg near Inanda, *Wood* 1290. Pietermaritzburg: Impendhle, *Acocks* 13772; Emkazeni, *Houshold* in F.D. Herb. 3180; Polela: Bulwer, *Good* in F.D. Herb. 6121; *Boocock* in F.D. Herb. 4101 (narrow leaf variant); Emkayeni forest, *Fernando* 91. Umzinto (Alexandra): Umgaye, Dumisa, *Rudatis* 1416, isotype of *L. marlothii* Knobl. (3 sheets).

CAPE.—Umzimkulu: *Miller* in F.D. Herb. 6123; Adam forest, *Leigh* in F.D. Herb. 6123 (long, narrow rather thin leaf, like L. marlothii); Insikeni: Dlokolwana forest, *Miller* in F.D. Herb. 6048. Libode: Hobokazi forest, *Miller* in F.D. Herb. 6048. Komgha: in woods, *Flanagan* 270 (3 sheets). Stutterheim: Fort Cunynghame, *Sim* 2103; Kabaku Hills, *Acocks* 8964. East London: in Queens Park but wild, *Galpin* 8219; *King* 1. Keiskamahoek: Mpamba, *Stayner* 52. King Williams Town: Pirie, *Sim* 1334 (BOL). Albany: Fern Kloof, *Story* 4497, 4498; *Britten* s.n. (GRA). Bathurst: Kowie, *Britten* 1847. Alexandria: south of town, *Story* 270. Port Elizabeth: Longmore Kloof, *Taylor* 840. Uitenhage: Zuurbergen between Hoffmanskloof and Driefontein, *Drege* s.n., isotype (L).

Not known to occur outside South Africa.

An isotype of the species, Drege from the Zuurberg, labelled in Meyer's handwriting " *O. foveolata* E. Mey. " and seen by Knoblauch was sent on loan to the National Herbarium, Pretoria, from the Ryksherbarium, Leiden (see pl. 21). An examination of this specimen showed that it compared well with specimens from regions eastwards and northwards of this locality, but not to the west of it. These specimens, although varying within limits, form a definite group, which is distinguishable from certain plants found on the Peninsula, at Knysna and elsewhere which, both Wright in the Flora Capensis and Adamson in the Flora of the Cape Peninsula, confused with *O. foveolata* E. Mey. The main distinguishing feature of these two groups is the glabrous ultimate branchlets in the group containing the Drege specimen, and the tomentulose branchlets of the group in which specimens from the Peninsula are found. Added to this the leaves in the former group are usually more than twice as long as broad, narrowing evenly to an obtuse apex and with the lateral veins not spreading very widely, as opposed to the rather broad (not twice as long as broad) leaves, shortly narrowed towards the apex, and then abruptly narrowed into a broad retuse acumen, with the lateral nerves widely spreading, in the tomentulose group, described below as a new subspecies.

Of the three subspecies, *L. foveolata* subsp. *foveolata* is the commonest and the most widely spread. It is also the most variable, but, to date, the variants have not been found to occur in sufficient numbers to form a group that could be constituted a variety. *L. marlothii* Knobl. has, for this reason, been put into synonymy without even varietal rank. In the type gatherings, which were collected at Dumisa, Natal, the leaves are long, up to 8 cm. long and of a thin texture with a light yellowish green colour on the lower surface. No specimen seen compares exactly with this material, of which there are a number of duplicates.

Another variant in Natal has small narrow leaves, about 3–5 cm. long and 1 cm. broad, but it too has not been found to occur repeatedly in the same form. In both these variants some of the leaves grade into the typical shape and size and so, for the present, they are classes as *L. foveolata* subsp. *foveolata.*

The distribution of this typical subspecies extends from the Transvaal through Natal and the Transkei to Port Elizabeth and Uitenhage, but not further westward.

FIG. 12.

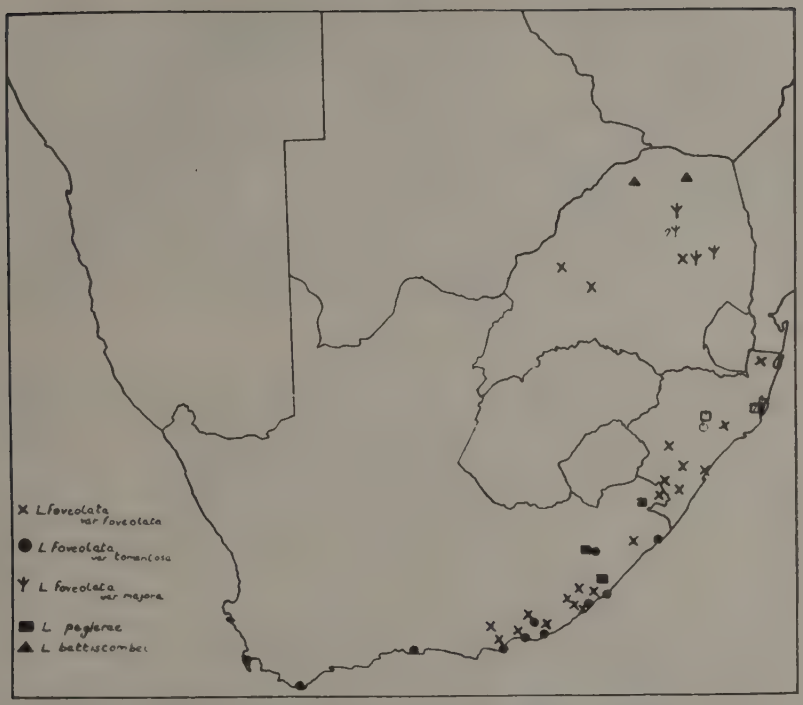

FIG. 12.—Distribution map of Linociera species.

(*b*) subsp. **tomentella** *Verdoorn*, subsp. nov. a typica ramulis ultimis tomentulosis differt. *O. foveolata* Harvey ex Wright in Fl. Cap. 4, 1: 485 (1907) in part; Adamson in Fl. of the Cape Peninsula p. 670 (1950), non E. Mey.

Besides the tomentulose branchlets this subspecies can be recognised by the following features: leaves rather thin, rarely subcoriaceous, broadly elliptic to oblong, mostly less than twice as long as broad, 2–6 cm. long and 1–3 cm. broad shortly narrowed to base and apex, and usually ending in a broad acumen which is retuse at the apex, sometimes sparsely pubescent at the base and on the midrib, at least on leaves on the new growth, lateral veins spreading at a wide angle, petiole very short, 2–5 mm. long; *inflorescence* ·5–1·5 cm. long with the bracts and calyx often densely setulose, glabrescent; *fruit* oblong-elliptic, green turning black, up to 1·5 cm. long and ·8 cm. diam.

PLATE 23.

Type: *Burchell* 5539 (PRE), Knysna forest, near the Knysna River ford.

CAPE.—Lusikisiki: near Fraser Falls, *Acocks* 13433 (rather thin small-leaved form). Engcobo: Egossa forest, *Sim* 2472 (rather thin and small leaves). Kentani: *Pegler* 826 (BOL). East London: *Näñni* 137. Albany: Fernkloof, *Story* 4496; 4483. Bathurst: Port Alfred, *Story* 4493 and 4529; Kowie, *Britten* 1879, 2104 (GRA) and 2998 (GRA). Alexandria: Coast Reserve, *Strauch* in F.D. Herb. 3247; Main Forest, *Sim* in F.D. Herb. 3165. Port Elizabeth: *Sister Antony* 29 (GRA); Krakakama, *Burchell* 4515. Knysna, *Burchell* 5539 (type, PRE); Gouna Forest, *Keet* 913; Salt River Forest, *Keet* 526; Belvedere, *Duthie* 584 (GRA); Sanjulie, *Phillips* 139 (GRA);

Buffalo Bay, *Keet* in F.D. Herb. 2591; Deepwalls, *Laughton* 461; *Keet* in F.D. Herb. 2393; Kaffirkop Rd., *Phillips* in F.D. Herb. 139a. Bredasdorp: Bosch Kloof, *Pillans* 9448, leaves only, large, no new twigs? Peninsula: without precise locality, *Mund & Maire* s.n.; Table Mountain, Orange Kloof, *Adamson* 877; Slangoolie Gorge, *Marloth* 11925 a & b; 4405 (BOL); Hout Bay, *Compton* 17069 (NBG); Skoorsteenkop, *Acocks* 639, coppice branch; Kirstenbosch, *Zeyher* 243, leaves only, (BOL); Skeleton Gorge, *Compton* 10020, coppice leaves, (NBG); Wynberg Hill, *Compton* 15452 (NBG); Oudekraal, *Kolbe* 2519 (BOL); Millers Poort, *Pillans* 9890, leaves only, (BOL); Llandudno, *Isaac* in Bolus Herb. 25301 (L, BOL); Witsand, *Lotsy and Goddyn* 1867. [Gerstner 4591, from the Nkandhla forest, Natal, may belong to this subspecies. It is a variant with thin leaves, some twice as long as broad, twigs slender, the inflorescence very short and densely setulose with yellowish hairs.]

Not known to occur outside South Africa.

As pointed out under the typical subspecies, specimens which belong here were cited under *Olea foveolata* E. Mey. in the Flora Capensis. One of the cited specimens, *Burchell* 5539 has been selected as the type of the new subspecies, the holotype being the specimen in the National Herbarium, Pretoria. Isotypes were seen in the Bolus Herbarium, the Albany Museum and Ryksherbarium, Leiden.

L. foveolata subsp. *tomentella* occurs on the Peninsula, at intervals eastwards along the coast and in the forests in the eastern Cape, the Transkei and probably in Zululand. In the coastal localities the specimens are fairly uniform and typical, but the forest specimens show some variation. In these the leaves are in a degree thinner and the inflorescences inclined to be shorter and more densely setulose pubescent. In other respects, such as leaf size and shape, these forest specimens vary among themselves and do not form a recognisable group. They are, therefore looked upon merely as variants within the subspecies. (For distribution see Fig. 12).

(*c*) subsp. **major** *Verdoorn* subsp. nov. a *L. foveolata* typica fructis majoribus usque 2·8 cm. longis 2 cm. latis, arbore majore, usque 30 m. alto, differt.

This subspecies is distinguished principally on the large fruits which are about the size of a small walnut. Before maturity these drupes have a rather characteristic shape being more or less ovate in outline, sub-quadrate and with a ridge over the obtuse apex, rather like a duck's bill (see Fig. 13). When mature they are more or less oblong, almost 3 cm. long and 2 cm. in diameter. The flesh is rather thin and the mesocarp hard with quite a large seed cavity. Other distinguishing characters are the glabrous branchlets, the larger leaves, up to 7 cm. long and 3·7 cm. broad, and the habit being a tall forest tree.

PLATE 24.

Type: *Urry* in National Herbarium, Pretoria, 28568, Marieps Kop, Pilgrims Rest, Transvaal.

TRANSVAAL.—Letaba: Woodbush, *Botha* in F.D. Herb. 3986. Lydenburg: Magalieskop, *Kotze* in F.D. Herb. 2823 and 2829 (leaves only). Pilgrimsrest: Mariepskop Forest, *Loock* s.n. (3 sheets); *Urry* in National Herbarium 28568, type, 2 sheets. *Keet* in F.D. Herb. 5938; *Loock* in F.D. Herb. 9387 and 9538; *Scheffler* n F.D. Herb. 9929; 10048; 10049; [O'Connor in F.D. Herb. 2014, Woodbush (no fruit, leaf rather long and narrow) and Renny DE3 (no mature fruit, leaves broad) cannot be determined subspecifically but may belong here.]

Not known to occur outside South Africa.

To date this subspecies has been found only in high altitude forests in the eastern Transvaal (Fig. 12). Without seeing the fruit some leafy specimens could be mistaken for the typical subspecies for although, in general, the leaves are broader yet some of the broad leaved variants in one may grade into the narrow leaved form of the other.

In the large fruits L. foveolata subsp. major resembles *L. peglerae* and *L. battiscombei*, differing from the former in the smaller leaves, up to 7 cm. long as against 13 cm. long in L. peglerae, and from the latter in the inflorescence being branched, not glomerate.

The following are some of the notes from forest officers on this tree: " Large angular drupes, not mature; common at higher altitudes and one of the more important species (commercially), but trees short and crooked in bole and contour, little merchantable timber." The following note is in part rather contradictory, " a large tree 80–90 feet high with a single large erect cylindrical bole 40–50 feet to first branch, DBH 24 in., bark grey, fissured, $\frac{1}{2}$ in. to 1 in. thick, heavy crown about 30–40 feet across. The fruits are eaten by birds, monkeys and bushpigs."

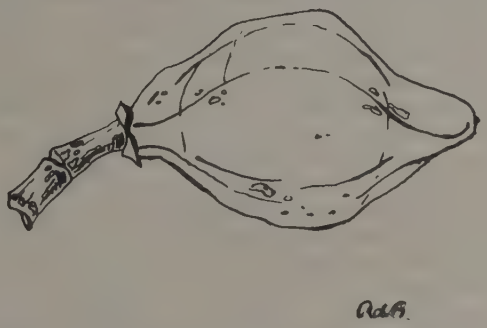

FIG. 13.—Fruit of Linociera foveolata (E. Mey.) Knob. subsp. major Verdoorn X 2.

2. **L. peglerae** (*C.H. Wr.*) *Gilg & Schellenb.* in Bot. Jb. 51: 71 (1914). *Olea peglerae* (in error *O. pegleri*) C.H. Wr. in Fl. Cap. 4, 1: 485 (1907).

Tree in tall forest, about 60 feet high, new growth glabrous. *Leaves* large, the majority 8–13 cm. long and 3–6·5 cm. broad (coppice leaves 19 by 8 cm., petiole short, base cuneate, not subcordate as in coppice shoots of L. foveolata), oblong, oblong-elliptic or obovate-oblong, often widest in upper half, usually long cuneate at base, shortly narrowing towards apex and abruptly narrowed into a broad obtuse acumen at the apex, acumen up to about 1 cm. long, midrib prominent beneath, lateral veins obvious, spreading at about 45°, usually with acarodomatia in the axils; petiole 1 cm. or more long, glabrous. *Inflorescence* of cymose panicles up to about 5 cm long glabrous, branches long and pedicels short; bracts sparsely pubescent glabrescent, sometimes ciliate. *Calyx* lobed to middle or beyond, lobes rounded at the apex, minutely ciliate. *Corolla* cream, lobes more or less 4 mm. long, united in pairs, slit to the base between pairs, margins infolded and apex cucullate (mocassin-like). *Stamens* inserted on joined portion between united pairs, anthers basifixed, 1·75 mm. long. *Ovary* subglobose, somewhat 4-lobed; style short, stigma terminal, sub-capitate, more or less 2-lobed; ovules attached along ventral side. *Fruit* 1·7–2·5 cm. long, 1·2–1·4 cm. broad, before mature somewhat ovate and quadrate in upper half with ridges across the top (duck's bill), sometimes faint. (Quite mature fruit not seen).

PLATE 25

Type: *Pegler* 819, Kentani.

CAPE.—Mount Curry: Fort Donald, *Forester* in F.D. Herb. 9437. Engcobo: Gora Forest, Mannina, *Laughton* in F.D. Herb. 9162 (leaves only); *Zahn* in F.D. Herb. 2045. Kentani: near Kentani, *Pegler* 819 (type number); Manubie, *Forest Officer* in F.D. Herb. 7965? Cult. Kirstenbosch, new area s.n. (NBG).

[*N.B.*—A specimen, Jackson in Natal Herb. 37523, from St. Lucia Bay, looks as if it might be this species; the leaves are poor (galled), up to 10 cm. long and 2·8–3·5 cm. broad, acumen pronounced on one, 3 fruits, 2 by 1·5 cm., oblong, only very slightly narrowed at top, ridge not obvious; also a leafy specimen collected by Bayer in Qudeni Forest may be this species.]

Not known to occur outside South Africa.

L. peglerae has the more typical leaf characters of the common tropical African species of *Linociera* being rather large, long cuneate at the base with a fairly long petiole and the lateral veins clearly raised on the under surface. In fruit characters it is like *L. foveolata* subsp. *majora* and *L. battiscombei* (= *Dekindtia africana*) with drupes developing to a large size even before they become mature and fleshy and, in the early stages, having a blunt ridge across the apex (like a duck's bill).

To date this species has not been collected very often and so is not at all well known. The following notes from sheets in the Forest Department Herbarium are therefore useful: " It is known at Manubie Forest as Bastard Black Iron Wood and by the Natives as Umdlebe. [On another sheet the Native name ' Umqumaswele ' is given]. This tree flowers in August and seed ripens in November or early in December. It grows fairly straight, to about 50 feet in height, with a diameter from 9–18 in. It is rarely purchased by Sawyers although I have frequently known them to work the wood up and attempt to sell it as *O. laurifolia* [meaning *O. capensis* subsp. *macrocarpa*] to wagon builders. It is reported to be much softer than [subsp. *macrocarpa*] and is subject to heart crack. It is fairly plentiful at Manubi Forest and generally throughout mountain forests of Transkei ". Miss Pegler writes of it " Large forest tree; glossy leaf, insignificant cream flowers." She does not mention a scent whereas several collectors of *L. foveolata* subsp. *foveolata* mention that the flowers of that subspecies are sweetly scented.

When first published in the Flora Capensis the epithet was incorrectly given as " pegleri " whereas it should be " peglerae " since the collector is cited as " Miss Pegler ".

3. **L. battiscombei** *Hutch*, in Kew Bull. 1914: 17. *Dekindtia africana* Gilg in Bot. Jb. 32: 139 (1902) non *Linociera africana* Knobl. (1834) nec (Welw.) Gilg & Schellenb. (1913).

Tree, mostly 12–15 feet tall with spreading canopy (in tropical african specimens up to 30 feet tall); ultimate branchlets (new growth) appressedly pubescent or puberulous, glabrescent. *Leaves* narrowly to broadly elliptic or oblanceolate to obovate-elliptic, 5–7·5 cm. long and 2–3·5 cm. broad (in tropical african material seen from 5–12 cm. long and 2–4·5 cm. broad), long or shortly cuneate at the base, acuminate, sometimes shortly so, often suddenly narrowed near the apex into a blunt acumen, lateral veins obvious on both surfaces, spreading at a fairly wide angle, usually over 45°, often with acarodomatia in the axils of the veins; petiole 3–9 mm. long. *Inflorescence* a reduced cyme, flowers appearing glomerate in the axil of the leaves, few to many in clusters; bracts and calyx densely adpressedly setulose pubescent without. *Calyx* deeply 4-lobed, the lobes up to 5 mm. long and opposite pairs slightly unequal in size. *Corolla* united at the base into a very short tube, lobes with margins infolded, apex cucullate (slipper toe). *Stamens* inserted on tube, filaments very short; anthers basifixed. *Ovary* slightly narrowed into a very short style; stigma terminal, 2-lobed; ovules attached along ventral face. *Fruit* blackish purple when ripe, about 1·8 cm. long and 1 cm. diam.; cotyledons thick, no albumen.

PLATE 26.

Type: *Battiscombe* 517, Nairobi forests, Kenya. Type of synonym: *Dekindtia africana* Gilg, *Dekindt* 73, Chella Mountains, Angola.

Transvaal.—Zoutpansberg: Tshakoma, *Obermeyer* 1080? (leafy specimen only). Pietersburg: Blaauwberg, *Codd* 8737; 8737a; *Codd & Dyer* 9118.

Also occurs in S. Rhodesia and northwards to Kenya and Angola.

When describing *Dekindtia* the author, Gilg, contrasted his new genus with *Olea* and did not mention its relationship to *Linociera*. The principal distinguishing characters mentioned are " the compact axillary inflorescences in the form of sessile nodules . . ., the shape of the corolla with its short tube and strongly elongated lobes with their turned-in margins and apices." In these corolla characters it fits in with the group of specimens here put under *Linociera* and therefore in this genus the apparently glomerate flowers would be the only distinguishing character. But there is a species, *L. congesta* Baker, from the Cameroons which is described as having flowers " in sessile or nearly sessile clusters in the axils of the leaves," also among the specimens under *L. foveolata* subsp. *tomentella* one from Zululand has a very much reduced cyme. Therefore even this character breaks down and the genus cannot be maintained as distinct from the section of *Linociera* here defined. The epithet " africana " has already been combined with *Linociera* [see *L. africana* Knobl. Bot. Centralbl. 61: 129, 1894, and *L. africana* (Welw.) Gilg & Schellenb. Bot. Jahrb. 51: 61, 1913], for species distinct from this one. The next specific epithet for a specimen which is obviously the same species, is *Linociera battiscombei* Hutch. and this is cited by Turrill as a synonym under *Dekindtia africana* in the *Oleaceae*, Flora of Tropical East Africa. It is unfortunate that there is no way of indicating when writing the name and the author that the species was previously described under another name.

From collectors notes it appears that this species grows at high altitudes along mountain streams. The Transvaal specimens were collected on the Soutpansberg and the Blaauwberg, the latter an isolated mountain up to 6,700 feet high, rising from the flats to the west of the Soutpansberg (see Fig. 12). The collector's notes state that the trees on the Blaauwberg were growing on a wooded stream bank at about 4,500 feet. The other record of this species in South Africa, is only a leafy specimen from Tshakoma in the Soutpansberg.

Among the South African species, *L. battiscombei* is in some respects near *L. foveolata* subsp. *tomentella*. Where the last mentioned has the new growth tomentulous, it is puberulous in the former. Both have rather broad leaves and, in some specimens in the subspecies the inflorescence is much reduced and the bracts and calyx lobes quite densely setulose; in these last mentioned instances the much smaller flowers, especially the calyx lobes, which are usually under 2 cm. long distinguish subsp. *tomentella* from *L. battiscombei*, which has calyx lobes up to 5 mm. long.

5. MENODORA.

Humb. & Bonpl. Pl. Aequin. 2: 98, t. 110 (1809); Harv. ex Wright in Fl. Cap. 4, 1: 483 (1907); Steyermark in Ann. Missouri Bot. Gard. Vol. 19: 87 (1932); Phill. Gen. S.A. Fl. Plants ed. 2: 572 (1951). *Bolivaria* Cham. & Schltr. in Linnaea 1: 207 (1826). *Calyptrospermum* A. Dietr. in Linn. Sp. Pl. ed. 6, 1: 226 (1831).

Perennial, suffruticose or sub-herbaceous from a woody base, erect or diffuse with a strong tap-root. *Leaves* simple or divided opposite, sub-opposite or alternate. *Inflorescence* cymose, paniculate or sometimes reduced to a single flower and then with monochasial development. *Calyx* persistent, united at the base with 5 to 10 lobes, lobes sometimes cleft. *Corolla* united, tube usually half the length of the lobes, usually pilose within at the insertion of stamens, lobes usually 5, imbricate. *Stamens* 2, filaments inserted on the tube and decurrent to its base, free above and exserted; anthers attached

near the base, erect, oblong, dehiscing by longitudinal slits. *Ovary* 2-lobed, 2-celled, ovules 2–4 in each cell, collateral, attached to the wall of partition about midway. *Fruit* a bi-locular capsule, usually both cocci developing, circumscissilely dehiscent. *Seeds* ex-endospermous, 1 to 4 in a coccus, reticulated.

Type species: M. helianthemoides Humb. & Bonpl. from Mexico.

The distribution of the genus *Menodora* is very interesting and can be used as evidence of the surmised land-bridge, Gondwana, that is thought at one time to have connected South America with South Africa. The three areas of distribution can be seen on Steyermark's map reproduced here (see Fig. 14) from his revision of the genus in the Annals of the Missouri Bot. Garden, Vol. 19, 1932. They are (1) S.W. United States and Mexico, (2) Central and southern S. America and (3) South Africa. The area marked in South Africa is not quite correct and must be extended to Namaqualand in the western Cape, and the Little and Great Karoo in the South (see notes under the species *M. juncea* and fig. 15).

At first sight it may seem hard to believe that this genus belongs to the family *Oleaceae* and indeed the history of its classification makes interesting reading (see Steyermark's Revision l.c.) but a critical examination will show that there can be no doubt at all about its close relationship to Jasminum, and that its correct place is therefore in the same family. It is interesting to know that the authors of the genus originally, but only tentatively, referred the genus to "*Jasmineae*" which is now *Oleaceae*. In the next three decades it was placed in turn in *Acanthaceae*, *Gentianaceae* and a separate family *Bolivariaceae* described to take *Menodora* and its synonym *Bolivaria* (Bolivaria was considered distinct at the time).

In the family *Oleaceae* the genus Menodora is distinguished by its fruit which is a bi-locular capsule, both cocci usually developing. Except for one species in the United States the dehiscence is by a horizontal suture, the top of the capsule coming off like a cap and exposing the seeds.

Key to Species.

Rigid suffrutex; leaves simple, usually much reduced; pedicel erect in fruit....	1. *M. juncea.*
Diffuse sub-herbaceous plants from a woody base; leaves mostly lobed or pinnatisect; pedicel cernuous in fruit:	
Leaves mostly bi-pinnatisect, segments subulate: calyx-lobes multipartite..	2. *M. africana.*
Leaves mostly 3 to 5-lobed, segments 1·5–2·5 mm. broad; calyx-lobes usually undivided.....	3. *M. heterophylla* var. *australis.*

1. **M. juncea** *Harv.* Gen. Pl. ed. 2: 220 (1869);* Harvey ex Wright in Fl. Cap. 4, 1: 484 (1907); Steyermark in Ann. Missouri Bot. Gard. 19: 150.

Suffrutex, virgate, 1–5 feet tall, branches rigid, suberect, terete, striate, minutely silvery puberulous. *Leaves* sessile, remote, linear, cuneate at the base, often much reduced, close pressed, 0·3–3 cm. long and up to 3 mm. broad. *Inflorescence* of one or several terminal, 3-flowered cymes. *Calyx* 5–6-lobed, tube usually 2·5–3 mm. long, lobes linear to linear-acuminate from a triangular base, 2·5–8 mm. long. *Corolla* yellow; tube about 6 mm. long; lobes oblong to oblong-obovate, 1·2–2 cm. long and ·7–1·4 cm. broad, broadly rounded at apex, mucronate. *Stamens* exserted; anthers 4–6 mm. long. *Ovary* deeply 2-lobed; style filiform up to 1·4 cm. long; stigma small, capitate. *Fruit* a 2-lobed capsule, sometimes only one lobe developing, sub-globose up to 9 mm. long and 8 mm. broad, the coat becoming chartaceous and dehiscing circumscissilely. *Seeds* black (seen through capsule wall on one of the borrowed specimens).

PLATE 27.

* Since this edition was published posthumously and edited by J. D. Hooker it has been suggested that "Hook. f." is the correct authority but see introduction.

Type: *Whitehead* s.n., Modderfontein, near Springbok, Namaqualand.

CAPE.—Namaqualand: Richtersveld, Kubus, *Marloth* 12282b; west of Anenous Mt., *Taylor* 1132 (BOL); Kamieskroon, *Acocks* 14996; *Pearson* 5639 (BOL); Soebatsfontein Road, *Thorns* s.n. (NBG); Numees Mine, *Pillans* 5108 (BOL); Stinkfontein, *Mathews* in Herb. Bol. 25412. Laingsburg: Near Grootfontein, *Marloth* 8347. Prince Albert: near Prince Albert Road, *Marloth* 4519 (BOL); Beaufort West: near Rosesberg Pass, *Acocks* 15885. Without locality, *Scully* in S.A. Mus. Herb. 41539 (SAM).

Endemic in the western and south western Cape.

The distribution of this species is in the karroid areas of Namaqualand, in the western Cape, and the Great and Little Karoo in south central Cape. It does not occur very generally in these regions, but is found in restricted localities within them. At such localities the individuals occur in fair numbers.

As pointed out in the notes under the genus the distribution in South Africa shown by Steyermark in his map (see Fig. 14) has to be extended. Steyermark had only one gathering, a Zeyher specimen, of *Menodora juncea*. The locality for Zeyher's specimen (see Linnaea 19: 590 No. 94) is rather vague for it reads " Georg, Karoo in the clearing of the Gouritz River, 1,000 ft. (IV, B, b, 14) ". Today the district of George is not near the Gouritz, but in the maps of Zeyher's day it is shown to extend westwards to that river. Today the Mossel Bay and Riversdale districts lie one on each side of the Gouritz river. From Drege's map " IV, B, b " is a strip inland from the coastal strip and this places the locality somewhere about the northern boundries of the districts mentioned that is near Herbertsdale which is similar veld to that in which the species occurs elsewhere. So Steyermark's locality which is shown by a circular spot near the coast in the south (see Fig. 14) should be moved slightly to the west and extended to the Great Karoo and the Namaqualand Karroid veld to complete the distribution of the genus as it is known today (see Fig. 15).

FIG. 14.—General distribution of the genus Menodora taken from Steyermark's revision in the annals of the Missouri Botanic Gardens Vol. 19 (1932).

Menodora juncea is very distinct from the other two South African species and has its allies in the Americas. It is a stiff erect suffrutex with remote leaves, most of them much reduced. The flowers are in compound cymes with the pedicels erect in fruit instead of, as in the other two species, 1-flowered inflorescences with monochasial development which results in the pedicels being cernuous in fruit (compare plates 27 and 28).

2. **M. africana** *Hook.* Ic. Pl. t. 586 (1843); Wood & Evans in Natal Plants 3: 17, Pl. 240 (1902); Harv. ex Wright in Fl. Cap. 4, 1: 484 (1907); Steyermark in Ann. Missouri Bot. Gard. 19, 1: 123 (1932); Fl. Pl. of Africa 30, pl. 1187 (1955).

Undershrub with many slender branches from a woody base; branches sub-herbaceous, slender, about 5–25 cm. tall, ridged, the ridges formed by decurrent bases of the petioles, sparsely scabrid. *Leaves* alternate, sub-opposite or opposite towards the base, sub-sessile to petioled, up to 1·5 cm. long, bi-pinnatisect with occasional simple or simply pinnate leaves, segments narrow, more or less subulate with inrolled scabrid margins. *Inflorescence* a reduced cyme with monochasial development; flowers solitary, terminal, appearing lateral when the main branch turns aside and a secondary one develops as the main axis and overtops the flower. *Calyx* sparsely or densely scabrid without; tube 2–3 mm. long; lobes longer than the tube, multipartite, segments more or less subulate. *Buds* red. *Corolla* yellow, tinged reddish; tube about 4 mm. long, narrow below widening at the mouth, sparsely pilose in the throat; lobes oblong about 1 cm. long and 4·5 mm. broad, rounded at the apex, mucronate, slightly narrowing towards the base. *Stamens* 2, filaments inserted in the corolla-tube, free for 3–4 mm. pilose where affixed to tube; anthers 3–4 mm. long, 1·5 mm. broad, sub-basifixed, erect, sometimes minutely mucronate. *Ovary* 2-celled, bi-lobed, ovules 4 in each cell, axillary; style about 9 mm. long; stigma small, capitate, terminal. *Fruit* a bi-locular capsule sometimes only one locule or coccus developing, borne on a cernuous pedicel, coat parchment like, dehiscing circumscissilely when ripe; seeds usually 2 or 3 in each coccus, about 1 cm. long, more or less oblong, outer coat reticulated.

Plate 28.

Type: *Burke* 134 (" 1341 " in error in Hooker's Icones), Vet River, Orange Free State.

Bechuanaland Protectorate.—Kanye: Pharing, *Hillary & Robertson* 480.

Transvaal.—Pietersburg: near Pietersburg, *v. d. Merwe* 2272; *Meeuse* 9153. Waterberg: near Palala, *Smuts & Gillett* 3371; Warmbaths, *Sidey* 1308; Leeuwpoort, *Rogers* 22393 (J). Pretoria: *Moss* 10142; 6 m. S. of Pretoria, *Verdoorn* in National Herbarium 28544; *Comins* 860; 3 m. S. of Pretoria, *Codd* 1740; near Irene, *Smith* 1099; Swingbridge area, *Repton* 3332; Arcadia, Stent in herb. 9563; Wonderboom Reserve, *Repton* 2765; Brooklyn, *Mogg* 15217; Derdepoort, *Leendertz* 369 (L, GRA); Hatherly, *Rogers* 109 (GRA); Magaliesberg, *Zeyher* 1132 (BOL); near Pretoria, *Bolus* 25415 (BOL); *McLea* in Herb. Bol. 25414 (not " 3104 " as cited in Fl. Cap.?) (BOL); Rooi Kop, *Smuts & Gillett* 2543; *Pole-Evans* 1249; Rust-der-Winter, *Gerstner* 5527. Lydenburg: *Wilms* 1068 (L). Barberton: Queen's River, *Galpin* 1071b; near Corocodile Poort, *Galpin* 1071 (GRA). Standerton: near Val Station, *Smuts* 397. Heidelberg: Lagerspoort, *Prosser* 1650. Germiston: Palmietfontein, *Gilliland* 26812. Modderfontein: *Haagner* s.n. (GRA). Johannesburg: Thorntree Kloof, *Moss* 6605 (Wits.). Vereeniging: *Gilfillan* 148. Potchefstroom: West of Potchefstroom, *Story* 760; Panfontein Reserve, *Louw* 1977; Boskop, *Louw* 355; Welverdiend, *Louw* 72; School of Agriculture, *Liebenberg* 934; 953; 985. Wolmaransstad: *Liebenberg* 3022. Christiana: Commonage, *Burt Davy* 12480; Kameelpan, *Theron* 439.

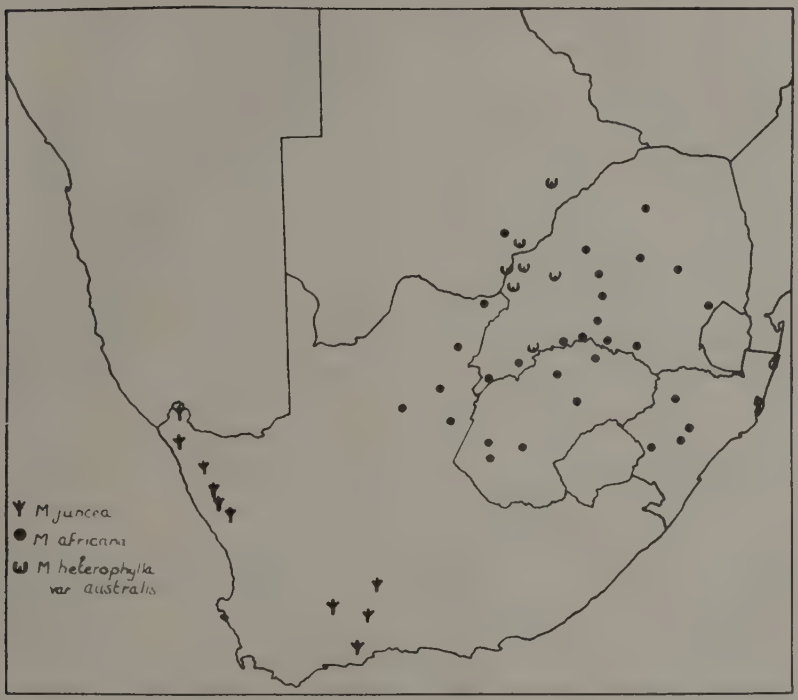

FIG. 15.—Distribution of 3 species of Menodora in Southern Africa.

CAPE.—Mafeking: Moshesh, *Brueckner* 420; *Appleyard* in SAM. Herb. 18090 (SAM); Pitsani Road, *Bolus* 6433. Vryburg: Armoedsvlakte, *Mogg* 8024. Between Kuruman and Vaal, *Cruickshank* in Herb. Bol. 2537; Between Kuruman and Vryburg, *Thorne* in SAM. Herb. 54476 (SAM). Griquatown: Postmasburg, *Wilman* 9116. Barkly West: *Marloth* 958; Hebron, *Flanagan* 1472. Kimberley: *Elliott* s.n.; *Moran* s.n.; *Moran* 86 (GRA); *Hafstroom* H 902; *Oliver* s.n. (SAM); du Toit's Pan, *Tuck* in SAM. Herb. 18089 (SAM); *Bolus* 25413 (BOL); Mostert's Hoek, *Acocks* and *Hafstroom* H992.

ORANGE FREE STATE.—Without precise locality: Vet River, *Burke* 134, Isotype (BOL); Draaifontein, *Rehmann* 3620 (BOL). Parys: *Moss* 13499 (J). Heilbron: *Goossens* 410. Kroonstad, *Pont* 228; *Schweickerdt* 1094. Senekal: Doornkop, *Goossens* 782. Bloemfontein: Glen, *Pole-Evans* 19627. Fauresmith: Heuningberg, *Marais* 172; Klipnek, *Marais* 140; Petrusburg, *Henrici* 4292.

NATAL.—Without precise locality: Tugela River, *Medley Wood* 3550; Muden Valley, *Repton* 1187; Dundee: Indumeni Mtn., *Truscott* 157; near Dundee, *Pegler* s.n. Klip River: Ladysmith, *Medley Wood* 7948 (L). Estcourt: Research Station, *West* 528; 420; *Pentz* 483; Colenso, *Schlechter* 3369 (GRA); Colenso, Tugela River, *Medley Wood* s.n. (GRA); bank of Tugela, *Medley Wood* 758 (SAM).

Not known to occur outside Southern Africa.

Burke on his expedition to the Transvaal with Zeyher, collected this species along the Vet River in the Orange Free State and on the Magaliesberg near Pretoria. When working on Burke's plants Hooker recognised this as a " congener with Menodora . . . hitherto supposed to be exclusively an inhabitant of the New World ". For the first

time then in 1843, botanists learned of this example of a connection between the flora of S. Africa and the Americas. Hooker described the species as *M. africana* (see Hook Ic. t. 586) and the plate accompanying his description is such a good one, giving the details of the distinguishing features, that it is reproduced here (see plate 28). The bi-pinnatisect leaf can be seen on this plate and the circumscissilely dehiscent fruit. There is one example of the cernuous pedicel to the fruit and this illustrates the monochasial development, for it can be seen that in flower the pedicel is erect and terminal and that it then turns aside and a secondary shoot develops as the main axis, the fruit therefore appearing lateral. The species is also illustrated and described in detail in Flowering Plants of Africa (Vol. 30, Pl. 1187).

M. africana has been found to occur in all four provinces of the Union and in the Bechuanaland Protectorate. For the distribution as it is known today see the map, Fig. 15. It is the most widely spread of the three South African species and is plentiful in the regions of its distribution as may be judged by the long list of citations.

This species is closely related to the following species *M. heterophylla* var. *australis*, see the notes under that species.

3. **M. heterophylla** *Moric* ex *DC.* var **australis** Steyermark in Ann. Missouri Bot. Gard. 19: 127 (1932). *Menodora heterophylla* Oliver in Hook. Ic. Pl. t. 1459 (1884); Wright in Fl. Cap. 4, 1: 484 (1907).

Undershrub with several to many slender, more or less erect branches from a woody base; branches about 7 to 25 cm. tall, slender, more or less angled and ridged, sparsely scabrid. *Leaves* very variable in size and lobing, alternate, approximate or sometimes opposite, sessile or petioled, irregularly and pinnately 3 to 5-lobed or simple, 4–18 mm. long, 3–6 mm. broad, the segments acute, 1·5–2·5 mm. broad, margins scabrid, inrolled, surface fairly sparsely glandpitted. *Inflorescence* a reduced cyme, monochasial, flowers terminal appearing lateral when overtopped by a secondary branch which takes the place of the main axis. *Calyx* persistent but not accrescent, 5–10 mm. long; tube about 2 mm. long; lobes 10–15, narrowly linear, entire or occasionally lobed, unequal in length and up to 1 mm. broad, acute, scabrid on the margins. *Corolla* yellow (sometimes with red infusion in parts?); tube about 3 mm. long, infundibuliform; lobes about 1 cm. long and 4·5 mm. broad, oblong, slightly narrowed at apex, or rounded with a mucro. *Filaments* inserted on the tubular portion of the corolla tube and pilose there, free for about 3 mm. *Anthers* about 3 mm. long, 1·5 mm. broad, sub-basifixed, erect, minutely apiculate. *Ovary* 2-lobed, style about 6–8 mm. long (appears to be red sometimes), stigma terminal, broadly capitate, obscurely bi-lobed. *Fruit* on a cernuous pedicel, a bi-locular capsule, occasionally only 1 coccus develops, dehiscing circumscissilely when ripe, coat parchment-like; seeds 1–4 in each coccus, 6–9 mm. long, 4–6 mm. broad, outer skin reticulated.

Type: *Pegler* 950 (BER), from near Rustenburg. [Type of the species, Berlandier 1499, between Laredo & Bejar, Mexico].

Bechuanaland Protectorate.—Lobatsi: *Rogers* 6225; 6 m. N.E. of Gaberones, *Codd* 8937. Mochudi: *Harbor* 6529 (BOL); *Rogers* 6372 (BOL). Mahalapye: *Mansergh* in Bol. Herb. 25416 (BOL).

Transvaal.—Marico: Zeerust, *Thode* A. 1442; 4 m. S. of Zeerust, *Acocks* 12415; Matebe Valley, Holub s.n. Rustenburg: near Rustenburg, *Pegler* 950 (on several sheets of this number there is a portion of *M. africana*, see notes); near race course, *Galpin* 9668; *Nation* 229 (BOL); Wonderfontein, *Gray* in Col. Herb. 4131; Zwartruggens, *Sutton* 852; 1113. Klerksdorp: *Phillips* 53; *Convent* 28 (GRA); *Sister Lucy* 11 (GRA).

Not known to occur outside above regions.

This variety was first collected by Dr. Em. Holub in the " Matebe Valley ", Marico, Transvaal. From information obtained recently at the Mission Station at Linokana, the " Matabe " is the stream passing through that village which is a few miles to the west of Zeerust. When the well known Kew Botanist N. E. Brown came upon the specimens in the collection presented to Kew by Dr. Holub in 1883 he identified them with the New World species *Menodora heterophylla*. A note in N. E. Brown's own handwriting on a Holub duplicate in the Bolus Herbarium reads in part " A most interesting discovery as the plant has hitherto only been found in Texas. I have minutely examined these Transvaal and the Texan specimens and can find no difference at all between them." Steyermark in his Revision, 1932, agrees that the S. African specimens are not specifically distinct, but owing to certain " morphological differences " he describes them as a variety of the New World species. The main difference is in the size of the leaves, which in the Texan plants are up to 4 cm. long and 3 cm. broad while in our plant they are seldom even half that size. Working with the African plants only it is not possible to form an independent opinion on this point, therefore the recent revisor of the genus is followed. In South Africa this variety is very close to *M. africana* and differs principally in the leaves being lobed rather than bi-pinnatisect, and the segments not being subulate. The calyx segments are usually simple and only occasionally lobed, instead of being usually multipartite; the habit also is rather more erect and rigid. If the plate from " Hooker's Icones ", which depicts Holub's specimen and is reproduced here (see Pl. 29), is compared with that of *M. africana* (see pl. 28), these differences will be very evident but, owing to the variation in size and shape of the leaves of *M. heterophylla* var. *australis*, it is not always quite so easy to distinguish between it and *M. africana*. Miss Pegler, for instance, whose specimen No. 950, is the type of the South African variety, evidently did not see the difference for her notes on the duplicate of the specimen in the National Herbarium, Pretoria, reads: " observed from Pretoria to Woodstock," Rustenburg district. It has also been found that on several herbarium sheets of her gathering 950 (including one in Pretoria and others in the Bolus and Albany herbaria), there is at least one piece of *M. africana* among the, to us, distinct specimens of *M. heterophylla* var. *australis*. To date *M. africana* has not been collected anywhere near Rustenburg but it is plentiful in the neighbourhood of Pretoria. It is therefore not possible at this stage to account for the mixture on Miss Pegler's specimen, but one is inclined to assume that she collected some of the material in the early stages of her trip when she observed the plant " from Pretoria to Woodstock " and the bulk of the material at Woodstock. It could only have been at intervals on the way that she could have seen plants, for neither species has an extended or general distribution but is found in patches under certain veld conditions.

When Oliver described Holub's find in the " Icones " he writes of the second South African species of Menodora, but it was really the third for in 1869 the second, Harvey's species *M. juncea*, was published.

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PLATE 1.—Jasminum quinatum Schinz; specimen from near the type locality in Lydenburg; whole plant, showing rhizome.

PLATE 2.—Jasminum tortuosum Willd.; holotype in the Berlin-Darlem Herbarium.

PLATE 3.—Jasminum tortuosum Willd.; on right, Drege s.n. in Ryksherbarium, Leiden (may be same gathering as cited by DC. under this species); on left, Muir 2400 from Mossel Bay district (PRE).

PLATE 4.—Jasminum angulare Vahl; on right Drege B, b, glabrous; on left, Drege a, tomentulose, specimen in Ryksherbarium, Leiden.

PLATE 5.—Jasminum fluminense Vell.; Burtt-Davy 360, Komatipoort (K) cited n Fl. Cap. under *J. angulare* but is not that species; note the very small calyx and broad inflorescence borne clear of the leaves.

PLATE 6.—Jasminum abyssinicum Hochst. ex DC.; Wylie in Medley Wood Herb. 8860, isotype, from Nkandhla, Natal.

PLATE 7.—Jasminum breviflorum Harv.; on right, Burke s.n. Magaliesberg, type (K) with leaves pubescent, not tapering to base and apex; on left top, two portions of Gerrard 1477, type of *J. gerrardi* (K), Nonoti Riv., Natal, with leaves glabrous tapering to base and apex; lower left hand, Rehman 7706, Natal, cited in Fl. Cap. under *J. gerrardi*, with glabrous leaves tapering to apex only.

PLATE 8.—Jasminum glaucum (L.f.) Ait.; specimen from Clanwilliam characteristic of species.

PLATE 9.—Jasminum multipartitum Hochst.; Krause 458, isotype (K), from near Durban; on same sheet Burke s.n. from Uitenhage district.

PLATE 10.—Jasminum stenolobum Rolfe; specimen from the Soutpansberg district, Transvaal.

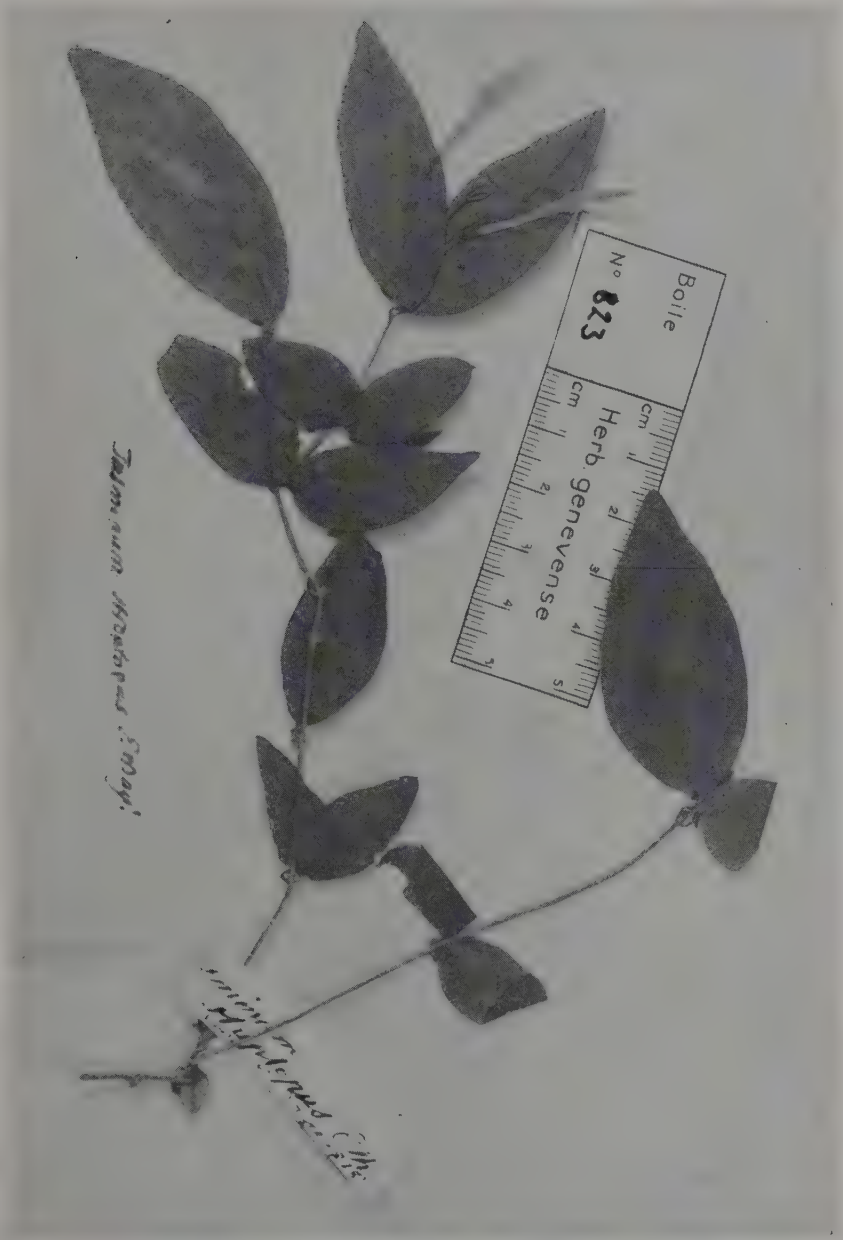

PLATE 11.—Jasminum streptopus E. Mey. var streptopus; Drege s.n., holotype, Geneva, collected at " Port Natal ".

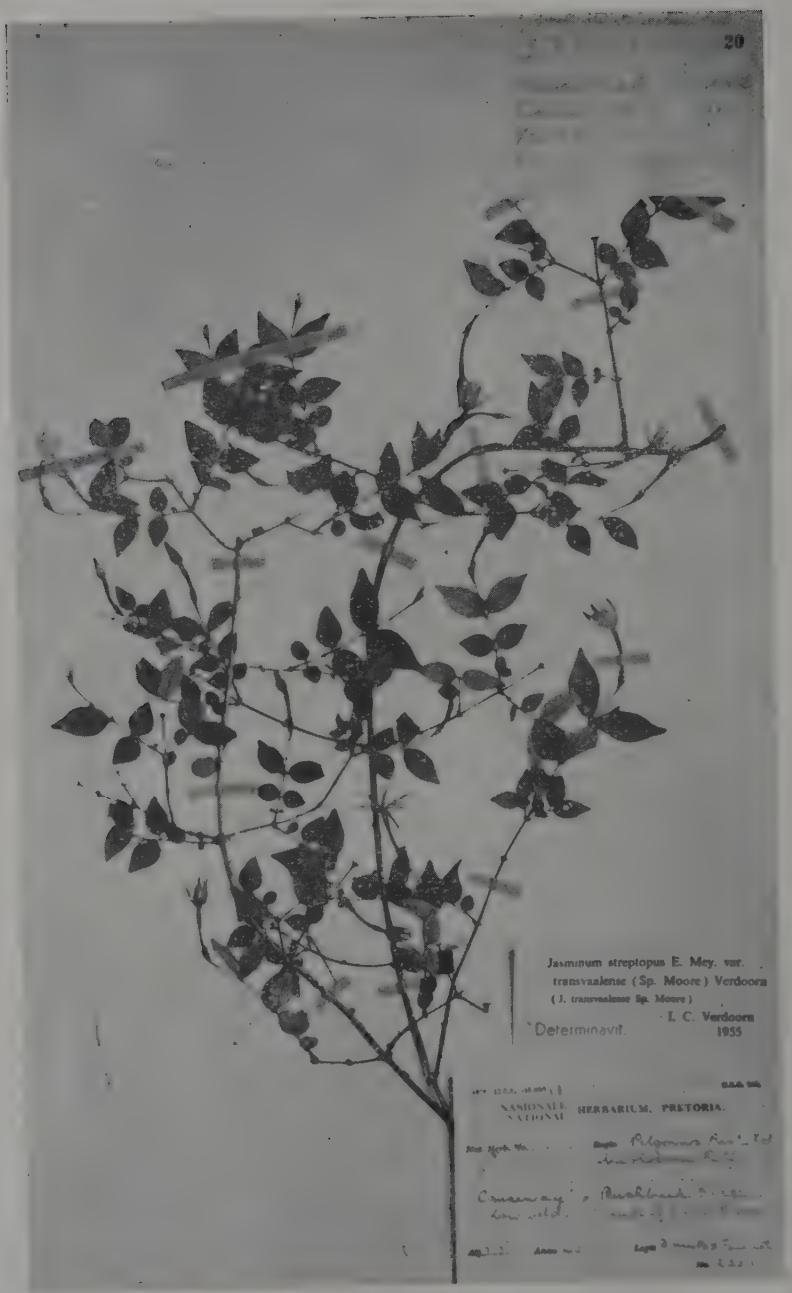

PLATE 12.—Jasminum streptopus E. Mey. var. transvaalense (Sp. Moore) Verdoorn; a characteristic specimen from the Pilgrimsrest district, Transvaal.

PLATE 13.—Olea africana Mill.; after Sim, Forest Flora of C.C., plate 105, under the name *O. verrucosa*.

PLATE 14.—Olea woodiana Knobl.; after Sim, Forest Flora of C.C., plate 108.

PLATE 15.—Olea exasperata Jacq.; after Sim, Forest Flora of C.C. plate 120, under the name *O. humilis*.

PLATE 16.—Olea capensis L. subsp. capensis; photo of type specimen of *O. capensis* L in the Linnaen Herbarium.

PLATE 17.—Olea capensis L. subsp. capensis, photo of type specimen of *O. laurifolia* Lam. in the Paris Museum.

PLATE 18.—Olea capensis L. subsp. capensis; photo of Drege s.n.; between Nieuwekloof and Elandskloof, Tulbagh district, isotype of O. concolor E. Mey. in Ryksherbariun Leiden.

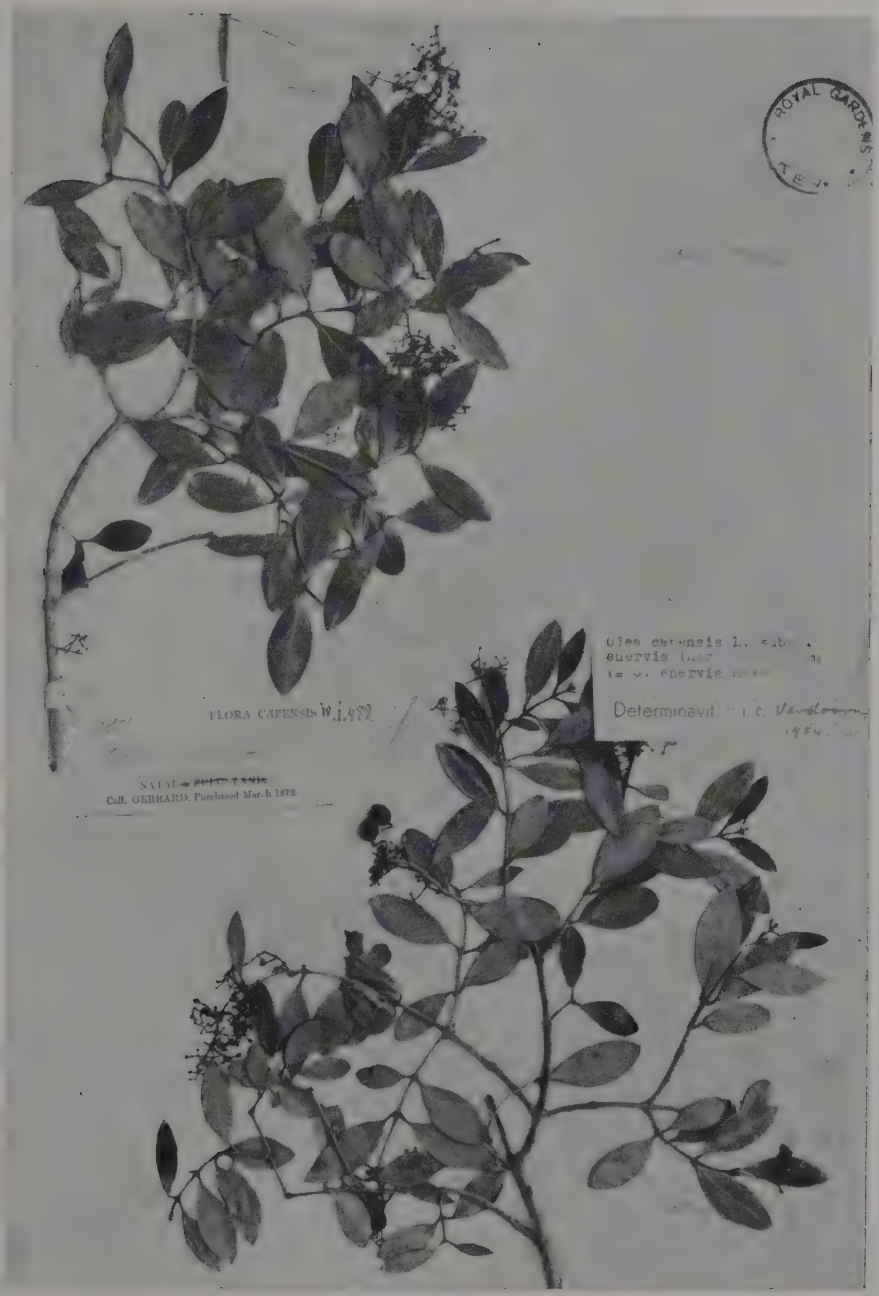

PLATE 19.—Olea capensis L. subsp. enervis (Harv.) Verdoorn; two specimens of Gerrard 1151, type (K).

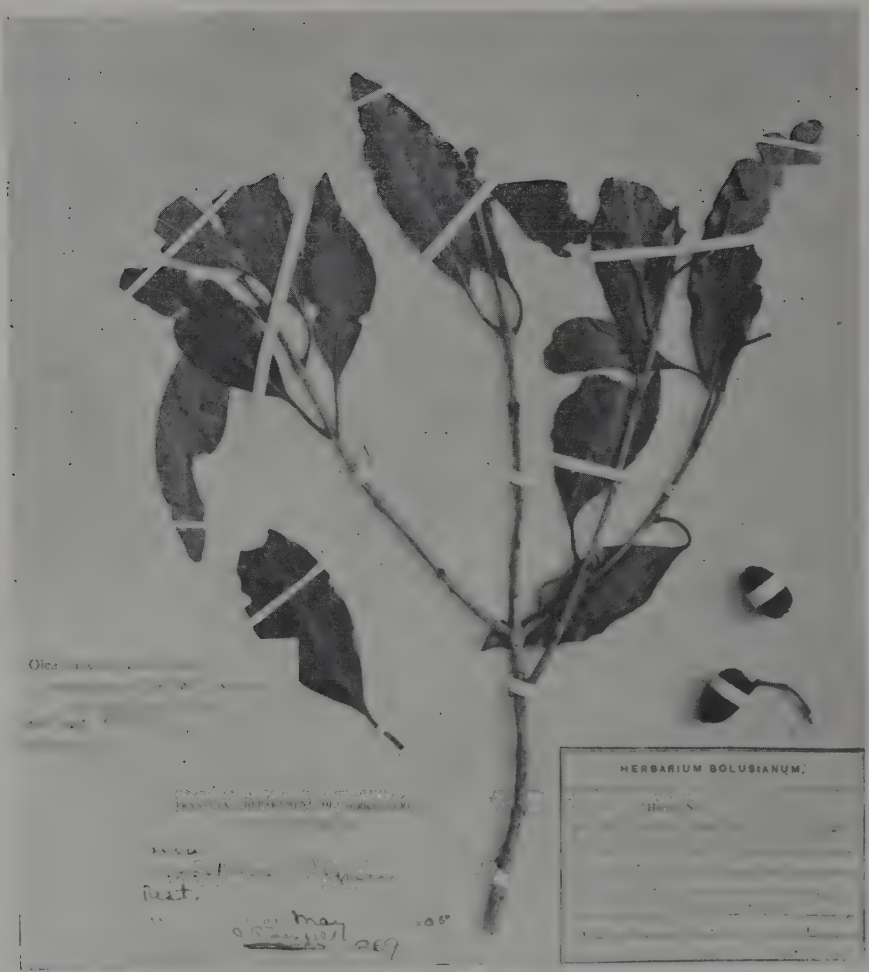

PLATE 20.—Olea capensis L. subsp. macrocarpa (C.H. Wr.) Verdoorn; Grenfell 869, isotype (BOL).

PLATE 21.—Lionciera foveolata (E. Mey.) Knobl. subsp. foveolata; Drege s.n., Uitenhage district, isotype of *L. foveolata* E. Mey.; branchlets glabrous and leaves comparatively narrow, (L).

PLATE 22.—Linociera foveolata (E. Mey.) Knobl. subsp. foveolata; Rudatis 1416, Dumisa, Natal, isotype of *L. marlothii* Knobl.; leaves somewhat thinner in texture and rather longer than in more typical specimens.

PLATE 23.—Linociera foveolata (E. Mey.) Knobl. subsp. tomentella Verdoorn; a characteristic specimen from Knysna; branchlets tomentulous, leaves broadly elliptic ending in a retuse acumen.

PLATE 24.—Linociera foveolata (E. Mey.) Knobl. subsp. major Verdoorn; a specimen from the type locality, Marieps Kop; note fruit large, though immature, ridged at apex and leaves rather broad.

PLATE 25.—Linociera peglerae (C.H. Wr.) Gilg & Schellenb.; Pegler 819, from Kentani, isotype (PRE); leaves large with comparatively long petiole and blunt acumen at apex.

PLATE 26.—Linociera battiscombei Hutch (= Dekindtia africana Gilg.); specimen from Blaauwberg, Northern Transvaal; the inflorescence glomerate in the axils of the leaves.

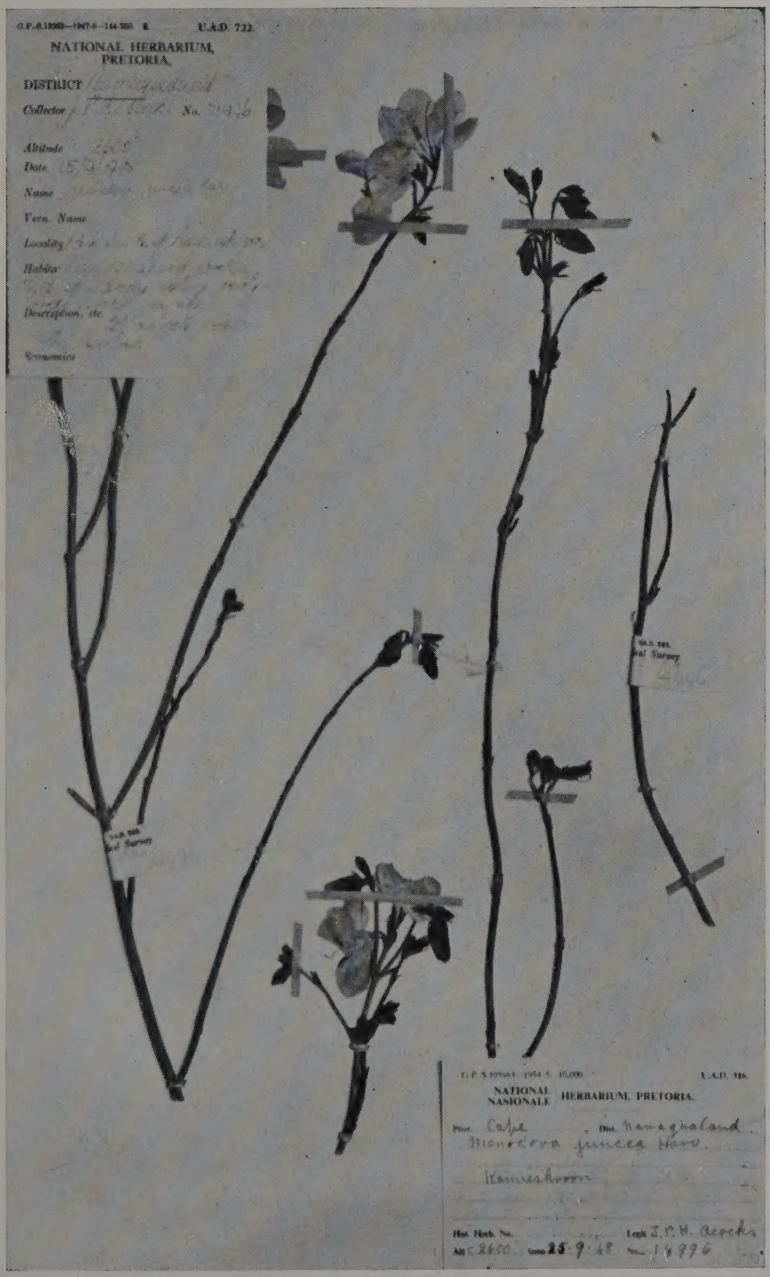

PLATE 27.—Menodora juncea Harv.; specimen from Kamieskroon, Namaqualand.

PLATE 28.—Menodora africana Hook.; from Hooker's Icones Plantarum, tab. 586, figure of type.

PLATE 29.—Menodora heterophylla Mor. ex DC. var. australis Steyermark; from Hooker's Icones Plantarum, tab. 1459.